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CONGRESS GOT IT WRONG: THE CASE FOR A NATIONAL RENEWABLE PORTFOLIO STANDARD AND IMPLICATIONS FOR POLICY

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I. INTRODUCTION

For a brief time in the late 1950s, Minnesotans waged a battle over whether to adopt daylight savings time. While a majority were in support of "fast time," as it was called then, rural farmers complained that they could not get into the field any faster because "the morning sun does not dry the dew on daylight savings time."[1]

Unwilling to take a firm stand either way, state legislators passed a bill that allowed some counties to adopt their own rules.[2] In the meantime, an alliance of movie theater owners, worried that people would not go to the movies when it was light

1. Grant Moos, *'Fast Time' Causes Tense Time at Capitol*, SESSION WEEKLY, Dec. 20, 1995 (quoting THE MINNEAPOLIS STAR, Jan. 28, 1959), *available at* http://www.house.leg.state.mn.us/hinfo/ swkly/1995-96/select/time.txt.

2. Moos, *supra* note 1.

out, sued the state.[3] Their efforts backfired when the Minnesota Supreme Court issued a ruling that barred counties from adopting a different time from the rest of the State and encouraged the state legislature to resolve the issue one way or another.[4] Later, in a contortion of legal reasoning that would make a justice's eyes cross, the State's Attorney General declared that the high court's action could not be enforced against counties that kept whatever time they wanted.[5] The result was that some parts of the State were on a different time than others: the State Capitol adopted daylight savings time, while the Legislature and Supreme Court remained on standard time.[6]

Minnesota's counties rebelled, joined by others across the nation, until a tangle of state and local legislation created as much confusion as a British farce. At one point, if you drove the 35 miles from Steubenville, Ohio, to Moundsville, West Virginia and wanted your watch to keep local time, you would have to change it seven times en route.[7] The chaos created by multiple time zones could not stand for long. Tired of the hodgepodge of time zones dividing the nation, Congress passed a law that preempted the states and made daylight savings time uniform across the country.[8]

While the value of renewable portfolio standards ("RPS") may not be as uniformly recognized as daylight savings time is today, it should be. Currently, there exists widespread consensus on the financial, environmental, and security benefits enjoyed by diversifying our nation's electricity fuels with clean, renewable resources. Twenty-eight states and the District of Columbia have already passed laws requiring utilities to use more of these resources.[9] Five more states—Florida, Indiana, Louisiana, Nebraska, and Utah—are considering mandating some form of

3. *Id.*

4. *Id.*

5. *See Id.*

6. *Id.*

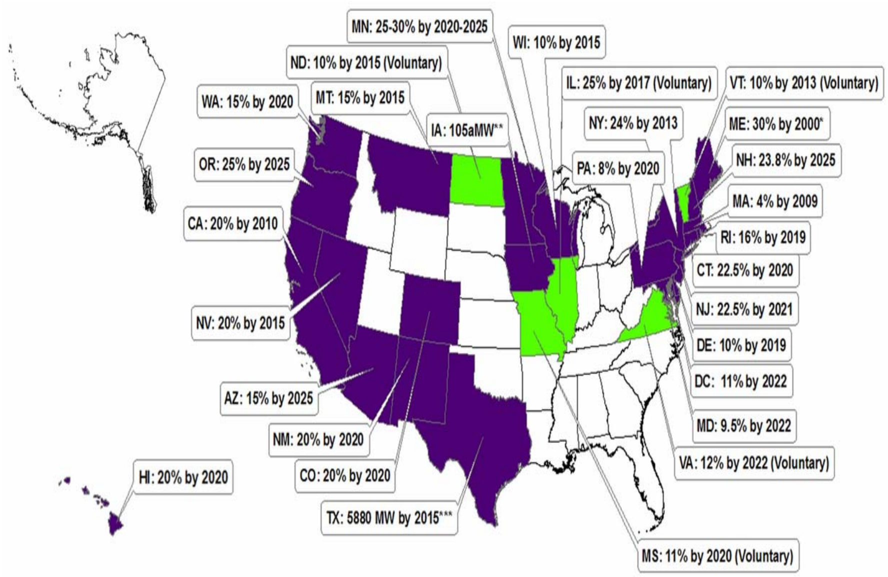
7. MICHAEL DOWING, SPRING FORWARD: THE ANNUAL MADNESS OF DAYLIGHT SAVINGS TIME (2006).

8. Moos, *supra* note 1. Congress extended daylight savings time in 2005. *See* Energy Policy Act of 2005, Pub. L. No. 109–58, 119 Stat. 594. In response, the entire state of Indiana adopted the new congressional boundaries of daylight-savings time. IND. CODE § 1-1-8.1-3 (2005); *see also* IND. SENATE MAJORITY ATTORNEY'S OFFICE, SUMMARY OF NEW LAWS 49–50 (2005), *available at* http://www.in.gov/legislative/senate_republicans/homepages/newlaws/2005/Drozda.pdf. Prior to the law, only certain areas of the state observed the time change. Hawaii, Guam, Puerto Rico, the Virgin Islands, America Samoa and most of Arizona continue to refrain. *See* BOB ALDRICH, CAL. ENERGY COMM'N, DAYLIGHT SAVINGS TIME: SAVING TIME, SAVING ENERGY, http://www.energy.ca.gov/ daylightsaving.html (last visited June 4, 2008).

9. *See infra* Figure 1.

RPS.[10]

While most state efforts have been laudable, state RPS statutes have created a patchwork of inconsistent, often conflicting mandates that distort the market for renewable energy technologies and unintentionally inflate electricity prices. By subjecting an increasingly interstate electric utility market to confusing and sometimes contradictory state regulations, the circus of state-based RPS programs discourages long-term investments and, in some cases, encourages utilities to exploit the inconsistencies.



* In addition to their mandatory standard, Maine has a separate goal of achieving 10% of non-hydroelectric renewable penetration by 2017.

** For incentive ratemaking purposes, the Iowa Utilities Board ("IUB") initially interpreted the state's RPS as "average capacity" based on kilowatt-hour output. For most of the statute's existence, the IUB's interpretation has mandated the payment of incentive rates for 260 MW of renewable energy, the nameplate capacity of 105 "average" MW.

*** The Texas statute originally set a goal of 2,280 MW by 2007 but increased the goal to 5,880 MW by 2015.

Figure 1: State RPS Policies as of July 2007
Source: U.S. Department of Energy, Pew Center on Global Climate Change, DSIRE Database of Renewable Energy Incentives. Figure courtesy of Benjamin K. Sovacool and Kelly E. Siman.

10. *Id.*

Yet the vacuum of federal leadership on renewable portfolio standards is not without consequence. The instability inherent in a state-based approach to RPS is dramatically distorting private investments in renewable energy generation nationally and prohibiting the expansion of a robust renewable energy sector in the United States. A federal mandate is critical to correcting these market distortions and signaling a national commitment to renewable energy generation. A federal policy would promote a national renewable energy technology sector that contributes to the U.S. economy, weans the nation from foreign and polluting sources of energy, and decreases the real and social costs of electricity for American consumers.

This Article argues that reliance on state-based action fosters uncertain regulatory environments for potential investors and creates inherent inequities between ratepayers in some states that are paying for "free riders" in others. Unlike previous studies concerning a national RPS, this Article does not attempt to make the case for RPS as a particular policy mechanism, nor does it focus exclusively on the benefits of renewable energy. Rather, it compares the benefits of a federal RPS to the confusion and unpredictability inherent within a patchwork of state-based RPS policies.

Part II briefly explores the history of state-based action on RPS, investigating the genesis of RPS proposals and analyzing their ability to promote renewable energy technologies.

Part III looks at the economic benefits of a national RPS. We argue that a consensus of models and preponderance of evidence predicts that a national RPS will decrease electricity prices and will lower electricity production costs, reduce fossil fuel prices, and reduce construction cost over-runs. A national RPS can speed transmission investment and improve the reliability of the nation's transmission and distribution infrastructure, as well as enhance the capacity factors of renewable energy technologies and improve energy security.[11]

Part IV investigates the environmental benefits of a national RPS. We suggest that a national RPS can help prevent "free riders," create a more equitable electricity marketplace, and avoid legal challenges related to the dormant Commerce Clause. A national RPS can help relieve water shortages, reduce air

11. "Capacity factor" is defined as "the ratio of the electrical energy produced by a generating unit for a given period of time to the electrical energy that could have been produced at continuous full-power operation during the same period." U.S. ENVTL. PROT. AGENCY, INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990–2005, 3-6 n.6 (2006) [hereinafter INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS], *available at* http://www.epa.gov/climatechange/emissions/ downloads06/07Energy.pdf.

pollution, curb greenhouse gas ("GHG") emissions, and preserve land compared to continued reliance on other electricity resources.

Drawing from state experiences, Part V makes eight recommendations about how policymakers should design a national RPS. To be effective, we argue that a national RPS must define renewable energy properly and must apply equally to all commercial load-serving entities. Moreover, we note that a national RPS must include penalties for non-compliance and create a national renewable energy credit ("REC") trading scheme.

II. STATE RPS PROGRAMS—NECESSARY BUT INSUFFICIENT

A. Conceptualizing RPS

A RPS is a legislative mandate requiring electricity suppliers—often referred to as "load serving entities"—in a given geographical area to employ renewable resources to produce a certain percentage of power by a fixed date.[12] Originally, RPS mandates were intended to promote the development of renewable energy technologies and diversify the fuels that America relies on for generating its electricity.[13] Policymakers intended these regulations to better reflect the social costs of electricity generation, counteract fossil fuel subsidies, and avoid the "free rider" problem.[14]

For example, hidden costs—often referred to as "negative externalities" and including the need to secure foreign imports of fuel, environmental damage from air and water emissions, medical expenses associated with air pollution and transportation accidents, catastrophic global climate change—are not typically reflected in the rates we pay for electricity.[15]

A majority of the federal budget for energy research and development ("R & D") over the past fifty years has gone to conventional fossil fuel and nuclear industries and not toward

12. *See* Kirsten Engel, *The Dormant Commerce Clause Threat to Market-Based Environmental Regulation: The Case of Electricity Deregulation*, 26 ECOLOGY L.Q. 243, 262 (1999).

13. AM. WIND ENERGY ASS'N, THE RENEWABLES PORTFOLIO STANDARD: HOW IT WORKS AND WHY IT'S NEEDED (1997), *available at* http://www.awea.org/policy/rpsbrief.html [hereinafter THE RENEWABLES PORTFOLIO STANDARD: HOW IT WORKS AND WHY IT'S NEEDED].

14. *See id.*

15. NAVIN NAYAK, U.S. PIRG EDUC. FUND, REDIRECTING AMERICA'S ENERGY: THE ECONOMIC & CONSUMER BENEFITS OF CLEAN ENERGY POLICIES 11 (2005).

renewable energy technologies. For instance, from 1948 to 1998, roughly 80% of U.S. Department of Energy appropriations for R & D have gone to nuclear and fossil fuel technologies.[16] Even though the coal, gas and nuclear energy industries are relatively mature sectors—electricity has been produced from coal for over a century—federal R & D expenditures continue to favor these industries at the expense of funds for newer renewable technologies. In fiscal year ("FY") 2006, for instance, the federal government allotted $580 million in R & D funds to fossil fuels and $221 million to nuclear.[17] The wind industry, in contrast, received only $38.3 million.[18]

Finally, because everyone benefits from the environmental advantages of renewable energy, private companies that invest millions of dollars in researching and developing clean energy technologies are often unable to recover the full profit of their investments.[19] Inevitably, the market allows some consumers to be "free riders," benefiting from the investments of others without paying for them.[20]

RPS mandates stimulate a market for renewable resources and spur additional research, development, and implementation of renewable energy technologies. Government intervention helps level the playing field by neutralizing a legacy of unequal subsidies. Mandating a certain percentage of renewable penetration also helps internalize some of the environmental costs associated with dirty energy sources and provides a mechanism for early developers of cleaner resources to recover more of the value of renewable energy technologies. RPS policies create an incentive for retail utilities to either build their own renewable facilities or buy RECs from other generators.[21] As the

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16. *Id.* at 12.

17. Carl Levesque, *What is the Percentage of Federal Subsidies Allotted for Wind Power?*, RENEWABLE ENERGY WORLD, Apr. 10, 2007, http://www.renewableenergyaccess.com/rea/news/ate/story;jsessionid=5B2CE80467DC456231081EF9A31B1E15?id=48070. The FY 2008 budget calls for expanding support of nuclear energy to an astonishing $547 million. *Id.*

18. *Id.*

19. *See* THE RENEWABLES PORTFOLIO STANDARD: HOW IT WORKS AND WHY IT'S NEEDED, *supra* note 13.

20. *Id.*

21. RPS policies provide regulated utilities with choices similar to the way emissions control strategies implemented in the 1970s and 1980s worked to reduce lead pollution from refineries and chlorofluorocarbons from aerosols. The Clean Air Act amendments of 1990 also used emissions credits as a market-based strategy to stimulate cleaner energy production. Cap-and-trade policies set an upper limit for emissions for a given time period, leading to lower emissions over time. *See* CONG. BUDGET OFFICE, POLICY OPTIONS FOR REDUCING CO_2 EMISSIONS VII–VIII (2008), *available at* http://www.cbo.gov/ftpdocs/89xx/doc8934/02-12-Carbon.pdf. Polluters could either reduce

demand for renewable energy grows, manufacturers gain experience that lowers the cost of clean electricity production for everyone.

B. Problems with the State-Based Approach

The problem, however, is that none of the existing state RPS mandates are alike. For example, Wisconsin has set its RPS target at 2.2% by 2011, while Rhode Island is shooting for 16% by 2020.[22] In Maine, fuel cells and high efficiency cogeneration count as "renewable," while the standard in Pennsylvania includes coal gasification and non-renewable distributed generation.[23] Iowa, Minnesota, and Texas set purchase requirements based on installed capacity, while many other states make it a function of electricity sales.[24] Minnesota and Iowa have voluntary standards, while Massachusetts, Connecticut, Rhode Island, and Pennsylvania all levy different noncompliance fees.[25] States vary in their targets, definitions of eligible resources, purchase requirements, REC trading schemes, and compliance mechanisms, among other things.[26] If America's interstate highway system were structured like our renewable energy market, drivers would be forced to change engines, tire pressure, and fuel mixture every time they crossed state lines.

Amid this complex morass of regulations, stakeholders and investors must not simply grapple with inconsistencies. In addition, they are forced to decipher vague and often contradictory state statutes.[27] In Connecticut, for example, the

their own pollution or buy certificates that represented emissions reductions beyond mandated targets. *Id.* at VIII. In a similar way, a RPS allows generators to either generate their own renewable energy or buy credits. It therefore blends the benefits of a "command and control" regulatory paradigm with a free market approach to environmental protection.

22. *See* U.S. DEPT. OF ENERGY, TRANSPORTATION HANDBOOK: STATE RENEWABLE PORTFOLIO STANDARDS AND PURCHASE REQUIREMENTS (2006), *available at* http://cta.ornl.gov/bedb/biopower/ State_RPS_and_Purchase_Requirements.xls.

23. *Id.*

24. *Id.*

25. *Id.*

26. *See id.*; *see also* MASS. DIV. OF ENERGY RES., RENEWABLE PORTFOLIO STANDARD: POLICY ANALYSIS (2002), *available at* http://www.mass.gov/doer/rps; NAT'L RENEWABLE ENERGY LAB., POWER TECHNOLOGIES ENERGY DATA BOOK (2003), *available at* http://www.nrel.gov/analysis/power_databook/chapter3.html; ILL. COMMERCE COMM'N, ILLINOIS SUSTAINABLE DEVELOPMENT PLAN 1–2 (2005).

27. For an excellent overview of state RPS programs, see John Fialka, *States Power Renewable-Energy Push*, WALL ST. J., June 14, 2006, at B2; Energy Info. Admin., State Renewable Energy Requirements and Goals: Status Through 2003, http://www.eia.doe.gov/oiaf/analysispaper/rps/ index.html (last visited on June 4, 2008); BARRY G. RABE, PEW CTR. ON GLOBAL CLIMATE CHANGE, RACE TO THE TOP: THE EXPANDING ROLE OF U.S. STATE RENEWABLE PORTFOLIO STANDARDS (2006), *available at*

state Department of Public Utility Control originally exempted two of the state's largest utilities from RPS obligations because the description of "electric suppliers" in the statute was unclear.[28] These exemptions created uncertainty over whether the statute would be enforced against any utilities at all.[29] Hawaii's standard contained so much "wiggle room" that it was unclear even to its own advocates whether it applied to most of the state's utilities.[30] Such ambiguity has lead to "wide disagreements among parties in regulatory proceedings" about how to enforce some state RPS mandates.[31]

The complexity of state-based RPS statutes is compounded by uncertainty over the duration of many state RPS programs. Stakeholders trying to plan investments in state renewable energy markets are tormented with unknowns.[32] For instance, New Jersey, New York, and Rhode Island will review and potentially modify their RPS schemes in 2008, 2009, and 2010, respectively.[33] Hawaii's standard expressly allows for its requirements to be waived if they prove to be "too costly" for retail electric providers and consumers.[34] Moreover, Arizona, New Mexico, and Maine may terminate their RPS programs entirely.[35]

III. THE ECONOMIC BENEFITS OF A NATIONAL RPS

In most states, RPS mandates have not significantly increased rates, and a consensus of economic models predicts that a national policy would generate substantial consumer savings exceeding even the existing patchwork of state programs. By expanding the amount of energy that would offset gas-fired generation, a national RPS would reduce demand on a strained and volatile natural gas market. Renewable energy units with

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http://www.pewclimate.org/docUploads/RPSReportFinal.pdf; NAT'L RENEWABLE ENERGY LAB., *supra* note 26, at 94–96.

28. Nancy Rader, *The Hazards of Implementing Renewable Portfolio Standards*, 11 ENERGY & ENV'T 391 394 (2000).

29. *See id.*

30. Ken Costello, *Regulatory Discretion in Implementing Renewable Portfolio Standards: The Case of Hawaii*, 18 ELEC. J. 51, 58 (2005).

31. *Id.*

32. *See* Ryan Wiser, et al., *Evaluating Experience with Renewable Portfolio Standards in the United States*, 20 ELEC. J. 8, 12 (2005) [hereinafter Wiser I].

33. Charles G. Willing, *Renewable Portfolio Standards Programs*, 5 DISTRIB. ENERGY 11 (2005).

34. *Id.*

35. Ryan Wiser, et al., *Evaluating Experience with Renewables Portfolio Standards in the United States*, 10 MITIGATION & ADAPTATION STRATEGIES FOR GLOBAL CHANGE 237, 257 (2005).

markedly faster lead-times than conventional and nuclear reactors speed the cost recovery of critical transmission investments and reduce the rate increases needed to pay for new transmission.

When utilities say a national RPS "costs" the sector, they are usually assuming future profits that will not be recoverable from consumers through higher electricity rates. For policymakers, balancing utility profits with electricity prices is one of the hard decisions we elect them to make. However, elected officials should consider that utility claims of lost profit are short-sighted and strategically unsound. In reality, a more predictable RPS regulatory environment decreases utility litigation and compliance costs relative to a growing web of vague and unstable state mandates. Expanding the universe of eligible renewable resources and establishing clear, uniform trading rules creates far more flexibility for regulated utilities and rewards utility investments on the basis of smart market strategy and not geography.

A. Lower Costs from Economies of Scale

Historically, all forms of electricity generation have followed the same general trend: the more technologies are deployed, the higher their capacity factor and the lower their costs. When coal and steam boilers were generating just a few gigawatts ("GW") of electricity in the early 1930s, they had capacity factors in the low twenties.[36] By 1997, when the deployment of coal-fired units reached thousands of GWs of capacity, their capacity factor had jumped to 61%.[37] Nuclear reactors also prove the concept. The World Nuclear Association notes that nuclear generators had a capacity factor of around 10% when just 22 GW were deployed.[38] Yet their capacity factor rose to 30% with the deployment of 53 GW and later reached nearly 90% once installed capacity reached 97 GW.[39] Similarly, the capacity factor for hydroelectric generators and geothermal plants increased in direct correlation

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36. *See* Benjamin K. Sovacool, *Distributed Generation (DG) and the American Electric Utility System: What is Stopping It?*, 130 J. OF ENERGY RES. TECH. 16, 19 fig. 1 (2008) [hereinafter *DG and the American Electric Utility System*].

37. J. Alan Beamon & Thomas J. Leckey, *Trends in Power Plant Operating Costs*, *in* ENERGY INFO. ADMIN., ISSUES IN MIDTERM ANALYSIS AND FORECASTING 4 (1999), *available at* http://tonto.eia.doe.gov/FTPROOT/forecasting/060799.pdf.

38. ANDREW PATERSON, WORLD NUCLEAR ASS'N, USING FEDERAL CREDIT TO MITIGATE CRITICAL FINANCIAL RISKS ON EARLY ORDERS FOR NEW REACTORS (2003), *available at* http://www.world-nuclear.org/sym/2003/paterson.htm.

39. *Id.*

with the amount of total installed capacity.[40]

The interrelationship between rising capacity factors and installed capacity suggests that, by forcing a greater amount of installed renewable capacity, a national RPS will significantly improve the capacity factors of renewable energy technologies. Recent experience with wind energy seems to confirm this rule. For example, in the 1980s and 1990s, wind turbines reported capacity factors in the low teens. By 2006, when installed wind energy had more than tripled in the United States, wind turbines registered capacity factors in the mid-thirties.[41]

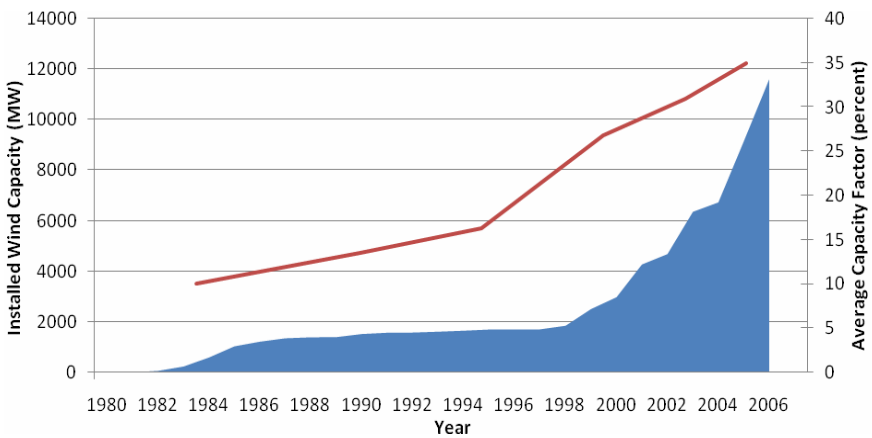

Figure 2: Average Wind Capacity Factors and Installed Capacity for the U.S., 1980–2006

Newer wind projects in Oahu, Hawaii and San Gorgonio, California have even achieved capacity factors of 36% and 38%, respectively.[42] In a 2006 analysis, the EIA observed that wind turbine capacity factors appeared to be improving over time and concluded that, "capacity factor grows as a function of capacity growth."[43]

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40. INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS, *supra* note 11, at 3-6; 1 ENERGY INFO. ADMIN., ELECTRIC POWER ANNUAL 2000, 5 fig. 4 (2001), *available at* http://tonto.eia.doe.gov/FTPROOT/electricity/0348001.pdf.

41. *See* CAL. ENERGY COMM'N, WIND PROJECT PERFORMANCE: 1995 SUMMARY 12 fig.1 (1997), *available at* http://www.energy.ca.gov/wind/documents/1995_wprs_report/95WINDREPORT.PDF.

42. ARTHUR SEKI, HAW. ELECTRIC CO., WIND ENERGY DEVELOPMENT ON OAHU, MAUI, AND MOLOKAI 5 (2002), *available at* http://hawaii.gov/dbedt/ert/wwg/wwg-08-seki.pdf; Paul Gipe, *California Updates Wind Stats*, WIND-WORKS.ORG, Feb. 7, 2002, http://www.wind-works.org/articles/lg_ws0202.html.

43. Chris Namovicz, Energy Info. Admin., Presentation at the ASA Comm. on Energy Statistics Fall Meeting: Emerging Technologies, Data, and NEM Modeling—Issues in Wind Resource Supply Data and Modeling 9 (Oct. 5, 2006), *available at*

Solar energy appears to follow this same pattern. In the early 1980s, when just 10 MW of solar photovoltaics ("PV") had been installed globally, the average capacity factor for solar panels was around 9%.[44] By 1995, however, after more than 70 MW had been installed, the average capacity factor of panels jumped to almost 15%.[45] In 2000, Researchers from the Institute for Energy Policy and Economics found that "over the last 10 years 'learning by doing' has led to a simplification of industrial manufacturing processes"; as a result, costs have fallen considerably and efficiency levels on the order of 18% for cells are expected in the near future at a competitive cost.[46]

Because the United States does not currently have a national RPS, it also lacks a relatively robust manufacturing base for most renewable energy technologies. Renewable energy developers in the United States largely rely on European or other overseas manufacturers for the requisite materials—and sometimes for expertise and labor, as well—to install renewable energy systems. This reliance on foreign materials and labor increases construction lead-times as well as shipping costs. It also increases the likelihood of unexpected delays and shortages.

The fragmented nature of state-based RPS policies actually compounds this problem by creating artificial bottlenecks in the distribution of materials necessary to deploy renewable energy systems. New state mandates can create unexpected surges in demand for renewable energy projects, driving up the price of components and labor. Roger Garratt of Puget Sound Energy ("PSE") recently suggested that the quick and somewhat unanticipated passage of Washington's initiative-driven RPS mandate created a seller's market "by increasing competition for projects and a shortage of turbine supplies" among wind manufacturers.[47]

A national RPS would instigate market-based solutions to unexpected material bottlenecks in at least three ways. First, by providing a stable investment stream and a predictable regulatory environment, investors would have a greater incentive to establish domestic manufacturing facilities and to rely on local

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http://www.eia.doe.gov/smg/asa_meeting_2006/ fall/files/nemmodel.ppt.

44. *See* Philippe Menanteau, *Learning from Variety and Competition Between Technological Options for Generating Photovoltaic Electricity*, 63 TECHNOLOGICAL FORECASTING & SOCIAL CHANGE 63, 68 fig.1 (2000).

45. *Id.*

46. *Id.* at 74.

47. Roger Garratt, Director of Resource Acquisition & Emerging Techs, Puget Sound Energy, Presentation at the Harvesting Clean Energy Conference: Exploring Wind & Solar Resources 15 (Jan. 29, 2008) (on file with author).

materials and labor. Second, under a national RPS, American developers would no longer suffer unfavorable exchange rates, given the recent weakening of the dollar, when purchasing materials. One wind company, Nordex, even estimated that changes in the exchange rate between Euros and dollars alone cost some American developers as much as $152,000 per project.[48] Third, given the certainty of a national market for renewable energy, investors would likely develop better economies of scale in manufacturing in order to ensure that a sufficient number of materials would exist to satisfy the resulting demand for renewable energy projects.

Some of these benefits have already been proven by state-based RPS programs. In those states that have already adopted more aggressive RPS statutes, the renewable energy industry has responded by streamlining manufacturing processes and lowering the cost of technology production. The California Energy Commission ("CEC") estimated that the average levelized cost of wind energy—the total cost over the life of a generator divided by the numbers of kilowatt hours ("kWh") produced—in California was 3.5 cents per kWh, less than one-eighth the price of producing wind energy just twenty-five years earlier.[49]

In a similar study, the Virginia Center for Coal and Energy Research ("VCCER") found that renewable generators fueled by landfill gases and wind offered one of the *cheapest* forms of electricity—3.0 and 4.0 cents per kWh, respectively—compared to all other generators including advanced coal, natural gas, and nuclear reactors.[50]

48. NORDEX, QUARTERLY REPORT I: 2002–2003, 17 (2003), *available at* http://www.nordex-online.com/fileadmin/MEDIA/Geschaeftsberichte/Nordex_02_03_Q1_E.pdf.

49. YURI MAKAROV, ET AL., CALIFORNIA ISO WIND GENERATION FORECASTING SERVICE DESIGN AND EXPERIENCE 3–4 (2005).

50. MICHAEL KARMIS ET AL., A STUDY OF INCREASED USE OF RENEWABLE ENERGY RESOURCES IN VIRGINIA 20–21 (2005), *available at* http://www.energy.vt.edu/Publications/Incr_Use_Renew_Energy_VA_rev1.pdf.

Technology	LCOE, in 2005 $/kWh
MSW-Landfill Gas	$.030
Advanced Nuclear	$.035
Wind	$.040
Scrubbed Coal	$.044
Integrated Gasification Combined Cycle (IGCC)	$.044
Geothermal	$.045
Advanced Combined Cycle Gas/Oil	$.047
Conventional Combined Cycle (CC) Gas/Oil	$.050
Biomass	$.050
IGCC with Carbon Sequestration	$.059
New Hydroelectric	$.061
Advanced Combustion Turbine	$.067
Advanced CC with Carbon Sequestration	$.069
Conventional Combustion Turbine	$.077
Natural Gas Fuel Cell	$.094
Solar Thermal	$.135
Solar, PV (30% capacity factor)	$.235
Solar, PV (10% capacity factor)	$.310

Table 1: Levelized Cost of Electricity ("LCOE") for Fossil, Nuclear, and Renewable Technologies[51]

VCCER's cost estimates are artificially high, because capital in a given industry becomes more productive as the level of cumulative investment increases. The more renewable energy technologies are developed, the cheaper they become. Experience from RPS states suggests that a national RPS would further reduce the cost of manufacturing renewable technologies. Because most renewable technologies are relatively immature, the potential for cost-savings from "learning" is relatively high.

For example, the Institute of Electrical and Electronics Engineers ("IEEE") estimated that a national RPS would bring about large-scale development of renewable energy and nationwide standards that would lower costs.[52] Furthermore, the IEEE suggested that such a "learning by doing" approach might also lower the expense of producing, installing, and maintaining renewable energy technologies.[53]

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51. *Id.*; *see also* CAL. ENERGY COMM'N, COMPARATIVE COST OF CALIFORNIA CENTRAL STATION ELECTRICITY GENERATION TECHNOLOGIES 3, 11 (2003), *available at* http://www.energy.ca.gov/reports/2003-06-06_100-03-001f.pdf.

52. SAM SCHOOFS, WASH. INTERNSHIPS FOR STUDENTS OF ENG'G, A FEDERAL RENEWABLE PORFOLIO STANDARD: POLICY ANALYSIS AND PROPOSAL 30 (2004), *available at* http://www.wise-intern.org/journal/2004/WISE2004-SamSchoofsFinalPaper.pdf.

53. *Id.*

We are already witnessing this "learning effect" with the increased penetration of large wind. The more turbines that are deployed, the more manufacturers invest in R & D to increase turbine size and improve performance. For example, in 1980, when the DOE started developing commercial wind turbines with only a few installed MW, wind energy had a levelized cost of around 81 cents per kWh.[54] After more than 6,000 MW had been installed by 2004, however, the levelized cost dropped sharply to around 5 cents per kWh and is projected to decrease further as more turbines are deployed.[55]

The DOE's Office of Energy Efficiency and Renewable Energy ("EERE") confirmed this "learning effect," projecting significant continued improvements in the competitiveness of wind technology over the next decade. EERE forecasted cost reductions due to discounts for large-volume purchases of materials, parts and components as well as from the "learning effects" that flow from deploying wind technology to meet greater cumulative electricity volumes.[56] In fact, researchers from Resources for the Future estimate that a 15% federal RPS by 2020 could further lower the construction costs for wind turbines by more than 20% and decrease the cost of biomass generators by nearly 60%.[57]

B. Reduced Fossil Fuel Prices

Because fossil fuels inherently involve competition over a limited commodity, supply and demand impacts create a vicious cycle that increases the value of the fuel and adds additional costs that must be absorbed by ratepayers. Because renewable energy technologies utilize domestic and widely available fuels to produce electricity, they also decrease demand on fossil fuels, thereby lowering prices as well.

For example, from 2002 to 2005, operation and maintenance expenses for utilities rose by nearly $26 billion.[58] Rising fuel

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54. *See* U.S. Dept. of Energy, Cost of Energy and Cumulative Domestic Capacity, http://www.eere.energy.gov/windandhydro/windpoweringamerica/images/newengland/economics_cost.jpg (last visited June 4, 2008).

55. *Id.*

56. OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY, U.S. DEPT. OF ENERGY, PROJECTED BENEFITS OF FEDERAL ENERGY EFFICIENCY AND RENEWABLE ENERGY PROGRAMS (FY 2008–FY 2050) app. E at 22 (2007), *available at* http://www1.eere.energy.gov/ba/pba/pdfs/ 41347_AppE.pdf.

57. Karen Palmer & Dallas Burtraw, *Cost-Effectiveness of Renewable Electricity Policies*, 27 ENERGY ECON. 873, 887 (2005).

58. ALDEN HATHAWAY, ENVL. RES. TRUST, THE IMPACT OF A RENEWABLE/EE PORTFOLIO STANDARD ON FUTURE RATE HIKES IN VIRGINIA 13 (2006), *available at* http://www.energyvacon.org/Program/2006/PDF/Track4/The_Impact_of_a_Renewable_EE

prices drove 96% of this increase.[59] Aggregate fossil fuel costs nearly doubled between 2000 and 2004 from $0.023 per kWh to $0.0437 per kWh.[60]

The overbuilding of gas-fired peaking plants in the 1990s resulted in skyrocketing demand for natural gas, which in turn caused prices to surge. Between 1995 and 2005, natural gas prices rose by an average of 15% *per year*, and the electricity sector's demand for natural gas increased from 24% of total natural gas consumption in 2000 to 29% in 2005.[61]

Consumption of natural gas is likely to increase even further for three reasons. First, increased electricity demand in many areas has shrunk reserve margins to historically low levels.[62] By 2005, reserve margins across the contiguous United States dropped to 15% and as low as 9% in some large states like Texas and Florida.[63] Shrinking reserve margins coupled with increased electricity demands have forced many utilities to restart "mothballed" natural gas fired generating units. Plans for new peaking units in large consumer states like Texas and Florida rely overwhelmingly on natural gas.[64]

Second, because U.S. utilities have over-invested in gas-fired generating units, they hunger for new supplies of natural gas. Congress responded recently by authorizing greater drilling rights in the Gulf of Mexico and also hinted at granting greater access to federal lands where natural gas drilling is currently off-limits.[65] Whether new drilling rights are granted or not, the tantalizing prospect of vast new sources of natural gas may lead utilities to believe that gas-fired units are safer investments than they really are.

Third, as pressure builds for the United States to adopt some form of binding GHG reduction target, more generators will turn to natural gas because its carbon intensity is about half that of coal.[66] For example, PSE's Roger Garratt recently told industry executives that PSE had plans to invest in a significant number

_Portfolio_Standards_on_Future_Rate_Hikes_in_Virginia_Hathaway.pdf.

59. *Id.*

60. *Id.* at 12.

61. *Id.* at 16.

62. MICHELLE MICHOT-FOSS, OXFORD INST. FOR ENERGY STUDIES, UNITED STATES NATURAL GAS PRICES TO 2015 12 (2007), *available at* http://www.oxfordenergy.org/pdfs/NG18.pdf.

63. *Id.*

64. *Id.*

65. Ken Silverstein, *Rockies Project: Laying the Groundwork*, ENERGYBIZ INSIDER, Apr. 30, 2007, http://www.energycentral.com/centers/energybiz/ebi_detail.cfm?id=316.

66. *See* Planet Power, Biomass Energy Education, http://www.treepower.org/outreach.html (last visited June 4, 2008).

of new natural-gas fired combined cycle facilities partly because the company anticipates future binding carbon constraints.[67]

The situation with natural gas prices became so severe that in the fall of 2006 ratepayers in Illinois waged a modern-day version of the Boston Tea Party, sending teabags to the state's utilities in protest of projected rate increases of 22% to 55% in 2007.[68] In Boston, homeowners and small businesses have seen electricity prices rise by 78% since 2002, from 6.4 cents a kWh to 11.4 cents a kWh.[69] Across the United States, average retail electricity prices rose by 9.2% in 2006 alone, a trend likely to continue for the next several years.[70]

Natural-gas induced price spikes have been devastating to the U.S. economy. Because natural gas accounts for nearly 90% of the cost of fertilizer, escalating natural gas prices in 2005 created significant economic hardships for U.S. farmers.[71] Additionally, some manufacturing and industrial consumers that relied heavily on natural gas moved their facilities overseas. For instance, the U.S. petrochemical industry relies on natural gas as a primary feedstock as well as for fuel. In 2004, the petrochemical sector lost approximately 78,000 jobs to foreign plants where natural gas was much cheaper.[72] When the price of natural gas spiked in 2001, almost half of the country's methanol capacity and one-third of its ammonia capacity were shut down, and the Dow Chemical Company moved 1.4 billion pounds of production from the United States to Germany because of higher energy costs.[73] Even dairy producers in California temporarily suspended milk and cheese production until natural gas prices receded, and three of the state's sugar refineries went bankrupt.[74] The country's higher natural gas prices have cost

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67. This information is based on the Authors' personal observations and notes taken at the Electric Utility Consultants, Inc. ("EUCI") 3rd Annual Renewable Portfolio Standards Conference in Westminster, Colorado (Apr. 23–24, 2007) [hereinafter Author Notes, EUCI 3rd Annual RPS Conference].

68. Rebecca Smith, *Emboldened States Take Charge of Energy Issues; Officials are Intervening in Proposed Utility Deals, Challenging Deregulation*, WALL ST. J., Oct. 12, 2006, at A6.

69. *Id.*

70. Don Kopecky, *The Trend Toward On-Site Power Generation*, ENERGYPULSE, Mar. 19, 2007, http://www.energypulse.net/centers/article/article_display.cfm?a_id=1445.

71. *Energy Policy Act of 2005: Hearing Before the Subcomm. on Energy and Air Quality, H. Comm. on Energy and Commerce*, 109th Cong. 487–95 (2005) (statement of Alan Nogee, Director, Clean Energy Program, Union of Concerned Scientists).

72. *Id.*

73. *Enhancing Energy Security: Hearing Before the H. Comm. on Natural Resources*, 108th Cong. 4 (2003) (statement of Raj Gupta, Chairman and CEO, Rohm and Haas Company).

74. *Wholesale Electricity Prices in California and the Western United States:*

the economy $50 billion and more than 100,000 jobs in Texas, Ohio, New Jersey, and West Virginia.[75]

As a result, many electricity generators switched back to coal-fired peaking units.[76] However, the switch only increased demand for coal, driving the price up. In 2003, for example, the cost of coal in Central Appalachia was $35 per ton.[77] The price increased nearly 7% *each year* until, by 2006, a ton of coal in the region cost close to $60 a ton.[78] In some areas of the United States, coal prices actually doubled between 2002 and 2004, due in part to high demand.[79] In addition, because the most economical reserves were already, a majority of the remaining coal and natural gas reserves were "stranded." While such stranded resources may be quite abundant, they are located primarily in areas geographically distant from major consuming areas and, thus, in areas from which it is more difficult to extract, process, and transport.[80]

A national RPS can save consumers money by reducing demand for both natural gas and coal. Several studies have documented that an increase in renewable energy production would decrease costs for electricity generation by offsetting the combustion of fossil fuels.[81] Because some renewable resources generate the most electricity during periods of peak demand, such resources can help offset electricity otherwise derived from natural gas-fired "peaking" or reserve generation units. For example, PVs have great value as a reliable source of power during extreme peak loads.[82] Substantial evidence from many peer-reviewed studies demonstrates an excellent correlation between available solar resources and periods of peak demand.[83]

Hearing Before the S. Comm. On Energy and Natural Resources, 107th Cong. 6–8 (2001) (statement of Sen. Dianne Feinstein).

75. *FY 2005 Budget Priorities for the Department of Energy: Hearing Before the H. Comm. on Energy and Commerce*, 108th Cong. 3 (2004) (statement of Joe Barton, Chairman, Committee on Energy and Commerce).

76. HATHAWAY, *supra* note 58, at 12.

77. *Id.* at 14.

78. *Id.*

79. *Id.*

80. ENERGY INFO. ADMIN., ANNUAL ENERGY OUTLOOK 2005, 3 (2004), *available at* http://tonto.eia.doe.gov/FTPROOT/forecasting/0383(2005).pdf.

81. *See* CLIFF CHEN, RYAN WISE, & MARK BOLINGER, LAWRENCE BERKELEY NAT'L LAB., WEIGHING THE COSTS AND BENEFITS OF STATE RENEWABLES PORTFOLIO STANDARDS: A COMPARATIVE ANALYSIS OF STATE-LEVEL POLICY IMPACT PROJECTIONS 26–27 (2007), *available at* http://eetd.lbl.gov/EA/EMS/reports/61580.pdf.

82. CHRISTY HERIG, NAT'L RENEWABLE ENERGY LAB., USING PHOTOVOLTAICS TO PRESERVE CALIFORNIA'S ELECTRICITY CAPACITY RESERVES 2 (2001), *available at* http://www.nrel.gov/docs/ fy01osti/31179.pdf.

83. *Id.*

Indeed, in California, an installed PV array with a capacity of 5,000 MW reduces the peak load for that day by about 3,000 MW, cutting in half the number of natural gas "peakers" needed to ensure reserve capacity.[84]

Researchers at Resources for the Future calculated that, given the historic volatility of the natural gas market, a 1% reduction in natural gas demand can reduce the price of natural gas by up to 2.5% in the long term.[85] This inverse relationship between renewable generation and natural gas prices was confirmed by researchers at the Lawrence Berkeley National Laboratory ("LBNL")[86] and the Union of Concerned Scientists ("UCS"), which found that a national RPS would save consumers more than $49 billion largely by depressing the price of natural gas used for electricity production and home heating.[87]

Some studies also document how RPS policies depress the price of *other* fossil fuels, such as oil and coal. For instance, in Pennsylvania, where more than 90% of electricity comes from coal and nuclear resources, a study conducted by Black & Veatch concluded that an aggressive RPS would result in a substantial reduction in fossil fuel consumption, lowering the price of coal and oil and ultimately providing cost savings to ratepayers.[88] The study noted that even a 1% reduction in fossil fuel prices would lead to a $140 million reduction in fossil fuel expenditures for the state.[89]

By developing indigenous renewable resources, all regions also can enjoy substantial cost savings from decreased fossil fuel transportation costs. Up to 80% of the cost of coal for ratepayers in Illinois goes toward covering railway costs.[90] Coal at the

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84. *Id.* at 2.

85. CAROLYN FISCHER, RES. FOR THE FUTURE, HOW CAN RENEWABLE PORTFOLIO STANDARDS LOWER ELECTRICITY PRICES 3 (2006), *available at* http://www.rff.org/Documents/RFF-DP-06-20-REV.pdf.

86. RYAN WISER, MATT BOLINGER, & MATT ST. CLAIR, LAWRENCE BERKELEY NAT'L LAB., EASING THE NATURAL GAS CRISIS: REDUCING NATURAL GAS PRICES THROUGH INCREASED DEPLOYMENT OF RENEWABLE ENERGY AND ENERGY EFFICIENCY (2005), *available at* http://eetd.lbl.gov/ea/ems/reports/56756.pdf (noting that "[w]hether by undertaking gas efficiency measures or by displacing gas-fired electricity generation, increased deployment of [renewable energy and energy efficiency] is expected to reduce natural gas demand and consequently put downward pressure on gas prices").

87. Alan Nogee, Jeff Deyette, & Steve Clemmer, *The Projected Impacts of a National Renewable Portfolio Standard*, 20 ELEC. J. 33, 39 (2007).

88. BLACK & VEATCH CORP., ECONOMIC IMPACT OF RENEWABLE ENERGY IN PENNSYLVANIA 56 (2004), *available at* http://www.bv.com/resources/reports/pa_rps_final_report.pdf.

89. *Id.*

90. Wyo. Coal Website, The Unit Train, http://smtc.uwyo.edu/coal/trains/unit.asp (last visited June 4, 2008).

mouth of a mine in Wyoming, for example, costs about $5 per ton, but by the time it reaches a power plant outside of Chicago, that same coal costs about $30 a ton.[91] The EIA estimated in 2003 that fuel costs accounted for an average of 76% of the operating expenses of coal-fired power plants *nationwide*.[92]

In 1999, coal accounted for 41% of all freight moved by U.S. rail carriers, frequently causing bottlenecks and contributing to both congestion and higher transportation costs.[93] In the typical operation of transporting coal by rail, an individual freight car spends as much as 50% of its time in a switchyard and another 40% in customer yards and sidings.[94] This means that an average ton of coal shipped by rail spends as little as 10% of its time actually moving towards its destination.[95]

The cumulative costs to transport natural gas may be even higher. Natural gas transportation and distribution already account for 41% of the residential price of natural gas.[96] Because the construction of natural gas pipelines can cost as much as $420,000 per mile,[97] fully constructing the natural gas infrastructure recommended by the Bush Administration's National Energy Plan—which calls for over 301,000 miles of new natural gas transmission and distribution pipelines[98]—could cost ratepayers as much as $126.4 billion.

Moreover, researchers for Western Resource Advocates assessed the ability of wind power to operate as a natural gas price hedge and found that wind energy showed a hedge value *only* when it was a substantial portion of a generation portfolio.[99] Indeed, 1 MW wind project in a 5,000 MW generation portfolio

91. *Id.*

92. *Future Options for Generation of Electricity from Coal: Hearing before the H. Subcomm. On Energy and Air Quality of the Comm. on Energy and Policy*, 108th Cong. 85 (2003) (statement of Roe-Hoan Yoon, Director, Center for Advanced Separation Technologies, Virginia Polytechnic Institute and State University).

93. Tugboats, GlobalSecurity.org, http://www.globalsecurity.org/military/systems/ship/ towboat.htm (last visited June 4, 2008).

94. WENDELL H. WISER, ENERGY RESOURCES: OCCURRENCE, PRODUCTION, CONVERSION, USE 121 (Springer 2000).

95. *Id.*

96. *DG and the American Electric Utility System*, *supra* note 36, at 19.

97. *Id.*

98. STEVEN CLEMMER, ET AL., UNION OF CONCERNED SCIENTISTS, AMERICAN COUNCIL FOR AN ENERGY-EFFICIENT ECONOMY & TELLUS INSTITUTE, CLEAN ENERGY BLUEPRINT 31 (2001), *available at* http://www.ucsusa.org/assets/documents/clean_energy/blueprint.pdf.

99. David Berry, *Renewable Energy as a Natural Gas Price Hedge: The Case of Wind*, 33 ENERGY POL'Y 799, 805 (2003).

had a negligible hedge value.[100] However, larger wind projects demonstrated a higher probability of realizing potential hedge benefits, especially during periods of high natural gas prices.[101] These results suggest that utilities could benefit more from an aggressive national RPS mandate that compels significant renewable energy investments than from direct incentives for projects that are small relative to a utility's entire generation portfolio.

C. A Uniform REC Trading Market Further Reduces Prices

Contradictory and imprecise definitions of "renewable energy" in state RPS mandates and other inconsistent restrictions have splintered the national renewable energy market into regional and state markets with conflicting rules on the treatment and value of RECs. The inconsistencies between state RPS mandates and their compliance mechanisms have caused spot REC prices to vary substantially across regions and across renewable technologies. Because some states allow out-of-state RECs to apply to in-state mandates, significant price fluctuations are possible even within a single service area.

For example, the wholesale price for wind-derived RECs ranges anywhere from $1.75 per megawatt hour ("MWh") in California up to $35 per MWh in the Northeast.[102] For biomass RECs, the price can range from $1.50 per MWh in Western states to $45 per MWh in New England.[103] For solar-derived RECs, the Western Electricity Coordinating Council indicated that wholesale prices *for the service area covered by its members alone* range anywhere from $30 to $150 per MWh depending on the state.[104]

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100. *Id.*
101. *Id.*
102. NAT'L RENEWABLE ENERGY LAB., POWER TECHNOLOGIES ENERGY DATA BOOK 130 tbl. 3.8.6 (4th ed. 2006), *available at* http://www.nrel.gov/analysis/power_databook/docs/pdf/db_chapter03_8.pdf.
103. *Id.*
104. *Id.*

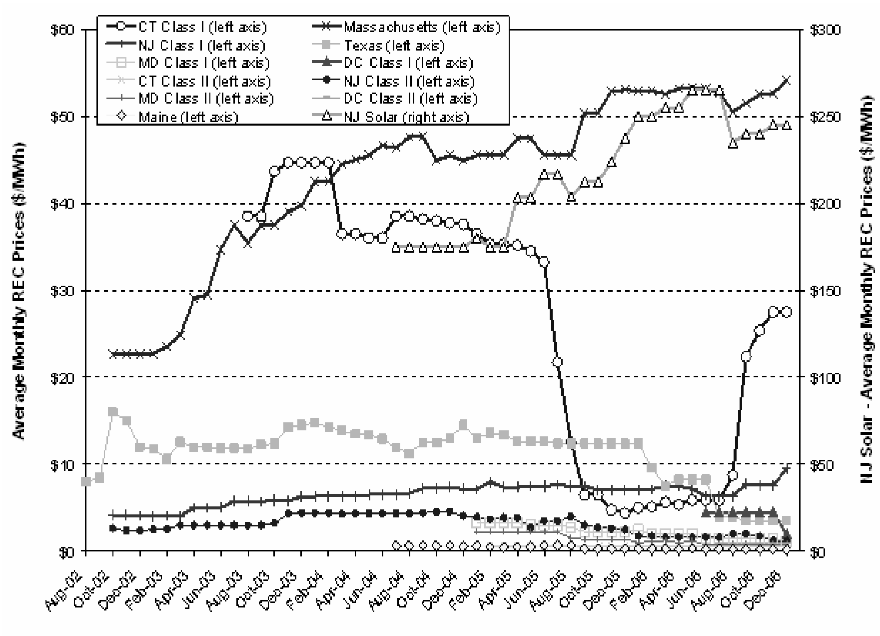

Figure 3: Price of Renewable Energy Credits in the U.S. (2002-2006)
Source: Lawrence Berkeley National Laboratory, 2007

In many cases, REC price fluctuations are the direct result of annual RPS-driven demand exceeding available renewable supply. To meet Massachusetts's RPS requirement, for example, utilities had to purchase 265,000 MWh of renewable credits from outside the state, pushing the REC price within the state to $51.41 per MWh.[105] The result is that the current patchwork of state RPS compliance schemes is already creating winners and losers among regulated utilities solely on the basis of their geographical location.

The volatility of REC prices limits the investment capital available for new renewable energy projects. While state systems share similarities, there is a critical lack of consistent fungibility between RECs issued in different states and control areas. There are thus no real REC "markets" among or even within the states, only individual state regulatory compliance systems. Thus, "[t]he lack of a real national REC market for state RPS compliance creates an absence of liquidity for RECs and thus for investment capital."[106]

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105. MASS. OFFICE OF CONSUMER AFFAIRS & BUS. REGULATION, ANNUAL RPS COMPLIANCE REPORT FOR 2004, 1 (2006), *available at* http://www.mass.gov/doer/rps/rps-2004annual-rpt.pdf.

106. Christopher Berendt, *A State-Based Approach to Building a Liquid National Market for Renewable Energy Certificates: The REC-EX Model*, 19 ELEC. J. 54, 57 (2006).

Renewable energy investors require reliable information and predictable rates of return from the start of the financing process. These fluctuating REC prices impede "renewable energy development because they offer unclear price signals to renewable energy investors about the attractiveness of development activity."[107]

By providing a common definition of eligible resources and consistent compliance rules, a national RPS would help establish a uniform REC trading market allowing renewable generators to sell their RECs to retail suppliers anywhere in the nation. To comply with RPS mandates, regulated utilities would have the option of investing in their own renewable capacity or purchasing RECs at a uniform price determined by the competition between suppliers harnessing renewable resources wherever their development is most valuable.[108] Thus, expanded REC markets will avoid price fluctuation and provide a more stable flow of revenue for the industry and a more predictable financing environment for investors.[109]

Federal leadership is required to establish uniform rules for regulating an industry that has matured beyond state borders. A national RPS decreases the potential for government interventions to create "winners" and "losers" because it would give regulated utilities the flexibility to invest in renewable resources wherever their development is most cost competitive. A national RPS would also require utilities to meet predictable and consistent regulations devised by policymakers whose national perspective transcends the parochial interests that routinely drive state-based policy.

An expanded interstate renewable energy market established under a national RPS would drive down the costs of RECs because supply would be pegged to demand organically rather than resulting from inconsistent, artificial geographical restrictions. By eliminating geographical barriers to REC exchange, a national RPS would provide the necessary market volume to create predictable rates of return for bulk investors. Standardized trading practices would validate RECs as fungible currency and would be far more cost effective for investors than trying to negotiate discreet investments in small or regionalized

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107. Wiser I, *supra* note 32, at 16.

108. Benjamin K. Sovacool & Christopher Cooper, *Green Means 'Go?' - A Colorful Approach to a U.S. National Renewable Portfolio Standard*, 19 ELEC. J 19, 25 (2006).

109. Pallab Mozumder & Achla Marathe, *Gains from an Integrated Market for Tradable Renewable Energy Credits* 49 ECOLOGICAL ECONOMICS 259, 270 (2004).

systems.[110]

A national REC trading market would also benefit regulated utilities. By allowing renewable generators to sell their RECs to retail suppliers anywhere, a national RPS gives regulated utilities the option of either investing in their own renewable generation or purchasing RECs from suppliers at the most competitive cost.[111]

By establishing a uniform REC trading market, a national RPS can: (1) provide flexibility for utilities that may not own renewable generators to more easily meet their portfolio requirements; (2) create a safety valve for utilities that own renewable generators, should they suffer from unexpected shortfalls; (3) allow regulated utilities time to plan investments, defer short term investments that may be unfavorable, or acquire the time needed to purchase equipment or negotiate contracts; (4) lower compliance costs, because a national market would allow utilities to buy credits from the cheapest suppliers; and (5) help overcome the physical inability to transmit energy from eligible resources, such as solar hot water heaters.[112]

Two recent studies document the cost savings associated with a national RPS that establishes a uniform REC trading market. Kent S. Knutson and Peter McMahan analyzed two national RPS scenarios, one with a nationwide REC system and one without. They found that a national REC trading scheme would save utilities $14 billion compared to a RPS without uniform trading rules.[113]

Another study from the European Union ("EU") assessed the costs of renewable energy in the EU under a scenario with and without uniform rules for trading RECs.[114] The study found that, with an EU-wide credit-trading scheme, the cost of renewable energy was approximately 12% less—around 9.2 eurocents per kWh—than without a uniform market.[115] Moreover, the study concluded that strategic deployment of renewable energy technologies under an EU-wide REC trading scheme could

110. JAN HAMRIN & MEREDITH WINGATE, DEVELOPING A FRAMEWORK FOR TRADABLE RENEWABLE CERTIFICATES 36 (2002), *available at* http://www.resource-solutions.org/lib/librarypdfs/NREL.TRC.Report.pdf.

111. *See* Sovacool & Cooper, *supra* note 108, at 25.

112. David Berry, *The Market for Tradable Renewable Energy Credits* 42 ECOLOGICAL ECON. 369, 371 (2002).

113. *See* Kent S. Knutson & Peter McMahan, *Closing the Green Gap*, 143 PUB. UTILS. FORTNIGHTLY 14 (2005).

114. In Europe, RECs are called "tradable green certificates." *See* M.H. Voogt & A.A. Uyterlinde, *Cost Effects of International Trade in Meeting EU Renewable Electricity Targets*, 34 ENERGY POL'Y 352, 353 (2006).

115. *Id.* at 352.

reduce costs for individual countries by up to 47%.[116]

D. Decreased Construction Cost Over-Runs

Classic electricity generation systems are typically "lumpy systems" in the sense that additions to capacity are made primarily in large lumps characterized by mammoth power plants and gargantuan transmission networks. Large facilities are extremely capital intense. For example, a typical 1,100 MW light water reactor can cost as much as $3 billion when licensing and construction expenses are included.[117] Moreover, planning and financing large facilities is fraught with uncertainty, especially when the balance of supply and demand can change rapidly and unexpectedly.[118]

Generally, the larger the project, the longer it takes to complete and the more the project runs the risk of encountering unforeseen changes in interest rates, labor expenses, and regulatory compliance costs. Because of these risks, utilities base resource acquisition decisions on long-term forecasts of future customer demand. Regardless, even these forecasts are fraught with uncertainty. Experts have a hard enough time predicting the weather or the outcome of political elections; imagine the difficulty of projecting the condition of an entire industry five, ten, or even twenty years from now.

In the 1970s and 1980s, excessively high forecasts of growth in demand for electricity led to overbuilding of generating plants and massive electric system cost over-runs in many states. One infamous example was in Washington State, where the Washington Public Power System ("WPPS") began a construction program for as many as seven new nuclear power plants in the early 1970s.[119] After large cost overruns and collapsing electricity demand growth in the late 1970s and early 1980s, the power system faced financial disaster and all but one of the plants was cancelled, leading to the country's largest municipal bond default at the time.[120] The entire experience came to be

116. *Id.* at 358.

117. *The Future of Nuclear Power: Hearing Before the Senate Subcomm. on Energy and Natural Resources*, 108th Cong. (2004) (statement of Marvin S. Fertel, Senior Vice President and Chief Nuclear Officer, Nuclear Energy Inst.).

118. *See* Jane Summerton & Ted K. Bradshaw, *Towards a Dispersed Electrical System: Challenges to the Grid*, 19 ENERGY POL'Y 24, 29 (1991).

119. Ed Vine, Marty Kushler, & Dan York, *Energy Myth Ten—Energy Efficiency Measures are Unreliable, Unpredictable, and Unenforceable*, *in* ENERGY & AMERICAN SOCIETY: THIRTEEN MYTHS 267 (Benjamin K. Sovacool & Marilyn A, Brown eds., Springer 2007).

120. *Id.*

called the "WHOOPS" fiasco, as a play off of the WPPS acronym, and represents "an enduring illustration of the risk associated with large electric system supply-side investments."[121] Consumers across the Northwest are still paying for WHOOPS in their monthly electricity bills.[122] While WHOOPS is perhaps the most spectacular example, similar "boom and bust" cycles in power plant construction and cost-overruns occurred in many states during the 1980s and directly produced the high electricity rates that spurred the "electric restructuring" movement of the mid-1990s.[123]

Unfortunately, construction cost overruns for conventional power plants are not relegated to history, nor are they limited to nuclear reactors. In November 2006, Duke Energy announced that the price tag for the company's proposed coal-fired power plants near Charlotte, North Carolina had soared to $3 billion.[124] Just two months prior, the company had reported to state utility regulators that the two plants would cost only $2 billion.[125] Charlotte's daily newspaper speculated that such a substantial cost discrepancy raised the possibility that the total expense for the plants could continue ballooning during the five years that the utility estimated it would take the company to build the facilities.[126]

A national RPS can help minimize construction cost overruns by deploying technologies that are smaller, modular, and less capital-intensive.[127] Renewable energy technologies require lead times of two to five years, or less, compared with conventional coal and nuclear plants that can take five to fifteen years to plan, permit, and construct.[128] Florida Power and Light ("FPL") boasts that it can take a wind farm from groundbreaking to commercial operation in as little as three to six months.[129] In 2005, PSE proved that FPL's boast was achievable in practice

121. *Id.*

122. *Id.*

123. *Id.*

124. John Murawski, *Cost of Power Plant Jumps*, THE NEWS & OBSERVER, Nov. 17, 2006, at D1.

125. *Id.*

126. *Id.*

127. AMORY LOVINS ET AL., SMALL IS PROFITABLE: THE HIDDEN BENEFITS OF MAKING ELECTRICAL RESOURCES THE RIGHT SIZE 117 (Beatrice Aranow ed., Rocky Mountain Inst. 2002).

128. Benjamin K. Sovacool, *Renewable Energy Technologies Just as Reliable as Fossil Fuel Plants*, SCITIZEN, Jan. 25, 2008, http://scitizen.com/screens/blogPage/viewBlog/sw_viewBlog.php?idTheme=14&idContribution=1407.

129. WORLDWATCH INST. CTR. FOR AM. PROGRESS, AMERICAN ENERGY: THE RENEWABLE PATH TO ENERGY SECURITY 16 (2006).

when it brought eighty-three 1.8 MW wind turbines at its Hopkins Ridge Wind Project from foundation pour to commercial operation in exactly six months and nine days.[130]

Solar installations may require even less construction time because the materials generally are pre-fabricated and modular. John Ravis, a project finance manager for TD BankNorth, recently told industry analysts that utility-level PV systems can come online in as little as two months, if the panels are available.[131]

Quicker lead times enable a more accurate response to load growth, and minimize the financial risk associated with borrowing hundreds of millions of dollars to finance plants for ten or more years before they start producing a single kilowatt of electricity.

Because renewable energy technologies can be produced at smaller scale, they can be located nearer to loads, enhancing their ability to match smaller increments of demand. PV panels—also known as solar panels—can be built in various sizes; organized in arrays ranging from watts to megawatts; and used in a wide variety of applications, including centralized plants, distributed sub-station plants, grid connected systems for home and business use, and off-grid systems for remote power use.[132] PV systems have long been used to power remote data relaying stations critical to the operation of supervisory control and data acquisition systems used by electric and gas utilities and government agencies.[133]

Because renewable technologies are faster to build and easier to deploy, they also limit financial risk and capital exposure. Modular plants can be cancelled easier, such that stopping a project is not a complete financial loss. The portability of most renewable energy systems means utilities can still recover value should the systems need to be resold as commodities in a secondary market.

Smaller units with shorter lead times also reduce the risk of purchasing a technology that becomes obsolete before it is

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130. According to Roger Garratt, PSE Director of Resource Acquisition, PSE poured the first foundation on May 18, 2005 and the Hopkins Ridge Wind Project began commercial operations on Nov. 27, 2005. *See* Garrat, *supra* note 47, at 6.

131. Author Notes, EUCI 3rd Annual RPS Conference, *supra* note 67.

132. BENJAMIN K. SOVACOOL, COAL AND NUCLEAR TECHNOLOGIES: CREATING A FALSE DICHOTOMY FOR AMERICAN ENERGY POL'Y (2007), *available at* http://www.springerlink.com/content/ q662275788652ml1/fulltext.html.

133. Peter Varadi & Gerry Braun, *SPV—The Security Photovoltaic Market*, RENEWABLE ENERGY WORLD, Sept.–Oct. 2003, *available at* http://www.mass.gov/Eoca/docs/dte/electric/03-121/ 422solenspm.pdf.

installed.[134] Quick installations can better exploit rapid learning, as many generations of a renewable energy technology can be developed in the same time it takes to build one giant conventional power plant.[135]

E. Better Debt-to-Equity Ratios for Transmission Investment

Like prisons and high school cafeterias, transmission lines would almost certainly be "inadequately funded if left to individual market participants."[136] Under normal market conditions, some utilities benefit from limited transmission resources. When the transmission system is saturated, less supply is available to meet existing demand, causing prices to increase. Thus, market forces create perverse incentives for some utilities to delay transmission upgrades unless or until they risk catastrophic system failure. According to the Federal Energy Regulatory Commission ("FERC"), market participants also complain that, by under-investing in transmission, companies that own both transmission and generation decrease the value of their generation assets.[137] Market dynamics can create situations where congestion prices benefit some electricity generators at the expense of customers, who not only pay higher prices but also suffer costs from the increased risk of blackouts.[138]

The current structure of the U.S. transmission system encourages some utilities to intentionally flood limited transmission lines to crowd out other generators. For example, in a 2007 letter to the Texas Public Utility Commission ("TX PUC"), FPL accused utility operator TXU of intentionally flooding West Texas transmission lines with high-cost power to prevent FPL's wind power from reaching customers across the state.[139] While TXU denied the allegations, the State's independent electricity market monitor found TXU guilty of similar market manipulations during the summer of 2005, and the TX PUC recommended that TXU be fined $210 million for that offense.[140]

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134. LOVINS, *supra* note 127, at 117.

135. *See id.*

136. Rajat K. Deb & Keith D. White, *Valuing Transmission Investments: The Big Picture and the Details Matter—And Benefits Might Exceed Expectations*, 18 ELEC. J. 33, 33 (2005).

137. *See* Proposed Pricing Policy for Efficient Operation and Expansion of Transmission Grid, 102 F.E.R.C. ¶ 61,032 (2003).

138. Deb & White, *supra* note 136, at 38.

139. Jim Fuquay, *TXU Facing Power Fight*, FORT WORTH STAR TELEGRAM, Apr. 25, 2007.

140. *Id.*

The National Council on Electric Policy—a joint task force created by the U.S. Department of Energy and the U.S. Environmental Protection Agency—noted that many system operators have an extra incentive to promote congestion through a technique known as "pancaked rates."[141] Pancaked rates:

> [C]ome into play when power under contract traverses more than one power system, and each system charges its full rate to provide transmission service. This method of pricing for a regional transmission system is expensive and tends to discourage companies from sending power over long distances and through several transmission systems, regardless of the value of the transaction to consumers.[142]

FERC established new transmission pricing rules, in part, to address the market distortion brought about by transmission congestion.[143] Under the new rules, FERC allows rate increases that permit utilities to recover higher than normal rates of return on transmission investments.[144] The rules also provide accelerated depreciation of transmission investments and allow utilities to recover from consumers 100% of the stranded costs for transmission projects that may ultimately be abandoned.[145]

Allowing utilities to recover the cost of transmission investments through rate increases and tax incentives, in theory, provides an economic incentive for utilities to make transmission investments that they otherwise would not. However, these incentives come at a cost to electricity consumers and American taxpayers. For example, prior to FERC's transmission incentives, the costs of abandoned transmission projects typically were split evenly between the investor and the electricity customers within the service area.[146] Under the new rules, utilities are allowed to recover all of the costs of the failed investment from consumers.[147]

Under normal circumstances, utilities cannot begin to recover much of the capital invested in new transmission until

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141. NAT'L COUNCIL ON ELEC. POL'Y, ELECTRICITY TRANSMISSION: A PRIMER 24 (2004).

142. *Id.*

143. *See* Promoting Transmission Investment Through Pricing Reform, 70 Fed. Reg. 71,409 (Nov. 18, 2005) (codified at 18 C.F.R. pt. 35 (2007)).

144. David Nosse, *FERC Finalizes Rule Promoting Transmission Investments; Grants Incentive Rates to AEP and Allegheny*, ENERGY LEGAL BLOG, June 26, 2006, http://energylegalblog.com/ archive/2006/07/26/242.aspx.

145. *Id.*

146. Jackie Java, *Rule Would Encourage Transmission Investment & Membership in Transcos & Transmission Organizations*, ENERGY LEGAL BLOG, Nov. 28, 2005, http://energylegalblog.com/ archive/2005/11/28/135.aspx.

147. *Id.*

generation facilities designed to fill the new capacity are in operation.[148] Long lead-times and unforeseen construction overruns often delay returns on investment for several years. Under FERC's new transmission pricing incentives, regulated utilities may start collecting 100% of the cost of the transmission expansions from ratepayers even before new generating capacity comes online.[149] The added cost to consumers can be substantial. The National Association of State Utility Consumer Advocates characterized FERC's transmission pricing scheme as "an unjustified multi-billion dollar giveaway of consumer money" and conservatively calculated the total consumer cost of FERC's transmission pricing rules at more than $13 billion.[150]

Creating incentives for utilities to invest in much needed transmission system upgrades actually may be one of the hidden benefits of a national RPS. Utilities can overcome public opposition to new transmission infrastructure by arguing for the need to access renewable resources. While public reaction to renewable energy is far from uniform, using access to renewable resources as a justification for new transmission can win local support for projects and speed their development. Because renewable energy technologies have much shorter lead-times than conventional power plants, utilities can begin using new power lines even as they wait to bring large conventional projects online. Quicker use of new transmission capacity benefits ratepayers because new rules allow utilities to start recovering the full cost of transmission investments even before utilities have built new capacity to fill them.

Utilities often face public opposition when trying to win regulatory approval for new transmission lines. Environmental groups may argue that the utility is overbuilding the system or that the utility overlooked alternative solutions. Local landowners may object to transmission line rights-of-way or oppose substations located too close to their property. In Faquier County, Virginia, one county supervisor recently rallied local opposition to Dominion Power's preferred route for a 500 kilovolt ("kV") line, declaring that "[t]his is a fight to the death!"[151]

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148. *Id.*

149. *Id.*

150. Nat'l Ass'n of State Utility Consumer Advocates' Comments on Proposed Rulemaking, Docket No. RM06-4-000 (Jan. 11, 2006), *available at* http://www.opc-dc.gov/pdf/NASUCAComments1.pdf (commenting on Promoting Transmission Investment Through Pricing Reform, 70 Fed. Reg. 71,409).

151. Donnie Johnston, *Dominion Line Plan Draws Opposition*, THE FREE LANCE STAR, Feb. 28, 2007, *available at* http://fredericksburg.com/News/FLS/2007/022007/02282007/263768.

Delays in transmission siting and development add substantially to the cost of infrastructure projects. To site transmission, utilities often incur significant pre-certification expenses and risk stranded costs should a permit be denied or public opposition halt the project.[152] In most cases, the costs of project delays are capitalized as the project moves forward, creating investor uncertainty and adding to the construction costs that are eventually passed on to ratepayers.[153] The longer a transmission project is delayed, the more it costs to finance and the more utilities must raise rates to recover those costs.

However, recent experiences suggest that opposition to transmission projects can transform into broad public support if the infrastructure is justified by the need to interconnect new renewable generation. For instance, in 2003, Xcel Energy received approval from the Minnesota Public Utilities Commission ("MN PUC") to site 178 miles of new transmission lines and four new substations in order to facilitate a tripling in size of its Buffalo Ridge wind farm. Early in the process, Xcel justified the new transmission as critical to expanding wind power generation at Buffalo Ridge, whose transmission lines were already fully subscribed.[154]

In a remarkable reversal of norms, local stakeholders accused the company of not proposing an adequate amount of new transmission and not working to build it fast enough. One senior environmental consultant noted how local landowners and advocates perceived environmental and economic benefits from renewable energy, and this shared perception translated into overwhelming support for Xcel's transmission upgrades:

> The combination of expanded use of renewable energy and the associated influx of potential economic gain in rural, primarily agricultural, regions have led to unprecedented

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152. TAPS, EFFECTIVE SOLUTIONS FOR GETTING NEEDED TRANSMISSION BUILT AT REASONABLE COST 13–14 (2004).

153. *Id.* at 15–16.

154. For background information concerning Minnesota's Buffalo Ridge wind farm, *see generally* OTTER TAIL CORP. ET AL., APPLICATION TO THE PUBLIC UTILITIES COMMISSION FOR ROUTE PERMITS: BIG STONE TRANSMISSION PROJECT, MNPUC Docket No. E017, et. al./TR-05-1275,(Dec. 9, 2005), *available at* http://energyfacilities.puc.state.mn.us/documents/18215/MN%20Route%20Permit_12.9.05.pdf (describing the request of a coalition of utility companies for a permit concerning two new high voltage transmission lines needed to increase transmission capacity and reliability for the Buffalo Ridge wind farm); L. BIRD ET AL., NAT'L RENEWABLE ENERGY LAB., POLICIES AND MARKET FACTORS DRIVING WIND POWER DEVELOPMENT IN THE UNITED STATES 19 (2003), *available at* http://eetd.lbl.gov/ea/emp/reports/53554.pdf (discussing the MN PUC's decision to grant Xcel a certificate of need for new transmission lines running from Buffalo Ridge to the Twin Cities).

> support of the transmission line projects. Environmental groups view the increased use of a renewable energy source as a positive step and recognize the need for additional transmission capacity to support siting of renewable generation facilities.[155]

Xcel's experience with Buffalo Ridge is a case study for how other utilities might win public approval for network upgrades that ultimately benefit all generators. By justifying transmission expansions through RPS-induced renewable generation, utilities can overcome opposition that would delay or stop transmission upgrades under normal circumstances. The cost-savings associated with quicker project approvals result in lower rates for consumers who would otherwise pay for the delays.

Line owners are not allowed to discriminate on the basis of generation source in distributing transmission resources, due largely to FERC's Open Access requirements on modern transmission systems.[156] Therefore, transmission built initially to access renewable resources can facilitate infrastructure expansions that benefit the entire portfolio of generation sources. Indeed, transmission upgrades justified by substantial new renewable generation can buy more time to allow zero-emissions coal and carbon sequestration technologies to become commercially viable.[157]

Moreover, under FERC's new rules, utilities may begin to recover the costs of transmission projects before the projects are completed and, thus, before new generating capacity is available to use the infrastructure.[158] In theory, this policy change decreases the cost to ratepayers by allowing utilities to begin

155. Michelle F. Bisonnette, Presentation at Power-Gen Renewable Energy & Fuels Conference: Getting the Crop to Market—Siting and Permitting Transmission Lines on Buffalo Ridge, Minnesota (Mar. 7, 2007) (on file with author).

156. *See* Preventing Undue Discrimination and Preference in Transmission Service, Order No. 890, 72 Fed. Reg. 12,266 (Mar. 15, 2007); Promoting Wholesale Competition Through Open Access Nondiscriminatory Transmission Services by Public Utilities, and Recovery of Stranded Costs By Public Utilities and Transmitting Utilities, Order No. 888, 61 Fed. Reg. 21,540 (May 10, 1996); *see also* Joshua Belcher, *FERC Order Breathes Wind into Sails of Alternative Energy Providers*, VT. J. ENVTL. LAW, Feb. 23, 2008, http://www.vjel.org/news/NEWS100055.html (noting that, under FERC's open access requirements, "[r]enewable energy generators stand to gain several benefits. Where transmission utilities once had discretion to determine capacity available for the transmission of alternative energy, [FERC] has acted to standardize the calculation. This should enhance the ability of alternative energy providers to serve customers on short term notice").

157. *See* David Olsen, Ctr. for Energy Efficiency & Renewable Techs., Presentation at Power-Gen Renewable Energy & Fuels Conference: Renewables—First Generation/Transmission Projects (Mar. 7, 2007) (on file with author).

158. *See* Promoting Transmission Investment Through Pricing Reform, 70 Fed. Reg. at 71,412.

paying down the financing of a project sooner rather than later. However, such an arrangement raises the obvious question: How do utilities know what a transmission project will cost prior to the project's completion?

FERC allows utilities to calculate a rate of return based on a hypothetical case that may be different from the actual capitalization of the project.[159] This "hypothetical capital structure" estimates how much debt a project will incur relative to its equity. In theory, this calculation would require utilities to assess future revenues derived from the transmission costs of electricity that runs through the new infrastructure.

However, FERC's rules create an incentive for utilities to craft a hypothetical structure with the goal of achieving excessive rates of return on transmission investments.[160] While such gaming may benefit investors, it is the consumers who ultimately pay.[161] Indeed, the American Public Power Association warns that hypothetical capital structures "can result in an investor windfall that could substantially increase actual levels to far in excess of the Commission's allowed return on equity."[162] The only check against such abuse is FERC's review of rate structures on a case-by-case basis.

Because renewable energy projects have construction lead times that are years, or even decades, faster than the lead-times for conventional or nuclear facilities, they can start generating electricity to be sold over new transmission lines much faster. Therefore, renewable energy systems can start providing revenue to help pay down debt on transmission investments while conventional plants are waiting to come online. If this expedited debt repayment is calculated in hypothetical capital structures, it may depress the projected capital costs of transmission expansions and provide a natural check to excessive rate increases. A national RPS mandate may therefore have the

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159. Comments of the Wyo. Office of Consumer Advocate, Docket No. RM06-4-000 (Jan. 9, 2006), *available at* http://psc.state.wy.us/htdocs/oca/fedcase/TransmissionInvestmentComments.pdf (commenting on Promoting Transmission Investment Through Pricing Reform, 70 Fed. Reg. 71,409).

160. *See* Comments of Nat'l Rural Elec. Cooperative Ass'n on Notice of Proposed Rulemaking, Docket No. RM06-4-000, at 25 (Jan. 11, 2006), *available at* http://www.nreca.org/Documents/ PublicPolicy/RM06_4NRECAfinal011106.pdf (commenting on Promoting Transmission Investment Through Pricing Reform, 70 Fed. Reg. 71,409).

161. *Id.* at 26.

162. *See* Comments of the Am. Public Power Ass'n, Docket No. RM06-4-000 21 (2006) (commenting on Promoting Transmission Investment Through Pricing Reform, 70 Fed. Reg. 71,409).

added benefit of decreasing the financing costs of new transmission and protecting ratepayers from excessive price increases.

F. Consensus of Models Confirms Economic Benefits

For many of these reasons, sophisticated studies conducted by the Union of Concerned Scientists ("UCS"), the U.S. Energy Information Administration ("EIA"), and the LBNL all confirm that a federal RPS would either lower electricity costs for consumers or have a negligible impact on electricity prices.

The most recent economic analysis by UCS in 2007 compared a range of potential economic impacts of a national RPS by examining four RPS scenarios matching proposals expected for consideration in the 110th Congress.[163] Using more *conservative* estimates than those used by the Department of Energy to forecast the market potential for wind, geothermal and biomass resources, UCS found that a federal RPS mandate would *lower* consumer energy bills in all four cases.[164]

UCS determined that a 20% federal RPS by the year 2020 would decrease consumer energy bills by an average of 1.5% per year and save consumers a total of $49.1 billion on their electricity and natural gas bills.[165] According to UCS, a 20% RPS by 2020 would lead to substantial cost-savings for four reasons: (1) a national RPS would reduce competition for fossil fuels and lower future prices; (2) many renewable energy technologies are now less expensive than new fossil fuel plants that generate the same amount of energy; (3) a national RPS would reduce the cost of renewable energy by creating economies of scale in manufacturing, installation, operations and maintenance; and (4) increased reliance on renewable energy would offset expensive natural gas-fired generation and "hedge" against volatile natural gas prices.[166]

Significantly, when UCS performed the same calculations without modifying any of EIA's assumptions, the results still favored a national RPS. Using EIA forecasts, UCS showed that a 20% RPS would save consumers in every region of the United States more than $27 billion in electricity and gas costs.[167]

In comparison, the EIA found that a 10% federal RPS by 2020 would have virtually no negative impact on electricity

163. *See* Nogee, Deyette & Clemmer, *supra* note 87, at 35–36.
164. *Id.* at 36–37, 39.
165. *Id.* at 39.
166. *Id.* at 38, 43.
167. *Id.* at 39.

prices.[168] The EIA projected that the cost of buying RECs would be small compared to overall electricity costs, and higher renewable energy costs would be offset by lower natural gas prices.[169] The EIA estimated that total electricity costs to consumers would increase 0.4%—from $351.9 billion to $353.4 billion in 2025—but expenditures on natural gas would decline 0.6%—from $136 billion to $135.2 billion.[170] Therefore, combined total energy expenditures under a 10% RPS were expected to be only 0.1% higher in 2025.[171]

Regardless, the EIA's analysis underestimated aggregate savings because it did not estimate the value of security benefits or system reliability derived from diversifying the nation's electricity fuel supply. Because renewable fuels tend to be more predictable and less interruptible than fossil and nuclear resources, supply costs are more stable than technologies that rely on conventional or nuclear fuels. In many cases, these additional benefits can result in substantial savings that are not incorporated into existing assessments of the economic impacts of a national RPS.

In March 2007, the LBNL released the most comprehensive and rigorous analysis ever conducted of the economic impact of state-based RPS policies. Researchers analyzed the results of twenty-eight different state or utility-level RPS cost impact projections since 1998.[172] Together, these projections modeled, proposed, or adopted RPS policies in eighteen different states.[173]

LBNL concluded that the long-term rate impacts of state RPS policies were projected to be relatively modest.[174] Nineteen of the twenty-eight state cost studies predicted rate increases of no greater than 1%, and only two of the twenty-eight studies projected increases of greater than 5%.[175] In fact, six of the studies projected rate *decreases*.[176] LBNL calculated that the median impact on a monthly residential electric bill would be thirty-eight cents.[177] Moreover, "when combined with projected

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168. ENERGY INFO. ADMIN., ANALYSIS OF A 10-PERCENT RENEWABLE PORTFOLIO STANDARD 20 (2003), *available at* http://tonto.eia.doe.gov/ftproot/service/sroiaf(2003)01.pdf.

169. *Id.* at 21.

170. *Id.* at 4.

171. *Id.*

172. CHEN, WISE, & BOLINGER, *supra* note 81, at i.

173. *Id.*

174. *Id.* at 58.

175. *Id.*

176. *Id.*

177. CHEN, WISE, & BOLINGER, *supra* note 81, at 58.

natural gas savings, the overall cost impacts of state-based RPS policies are even more modest, resulting in net consumer savings" in at least seven of the cases.[178]

A comparison between the UCS study of national RPS proposals and LBNL's analysis of state-based RPS policies suggests that a national RPS could result in substantially higher cost savings than a patchwork of state-based policies. The following section identifies several reasons that a national mandate is more likely to reduce electricity rates than continued reliance on state-based policies.

IV. THE ENVIRONMENTAL BENEFITS OF A NATIONAL RPS

In economics, those consuming more than their fair share of a resource while shouldering less than their share of the costs of producing it are known as "free riders."[179] Relying on states alone to adopt RPS programs creates a classic free rider problem because environmental damage from conventional power plants does not stop at state borders. Sulfur dioxide ("SO_2") and nitrogen oxides ("NO_x") emissions from coal-fired power plants in Midwestern states drift across borders and cause acid rain to damage watersheds in the Northeast.[180] Mercury from power plants in the Ohio Valley ends up in Maine forests and New Hampshire lakes.[181] The resulting environmental problems provide powerful incentives for affected states to adopt more aggressive renewable energy policies while non-affected states that are often the source of the pollution get a "free ride."

Upwind and upstream states that do not suffer the full burdens of their pollution have little incentive to adopt policy reforms to address it.[182] Historically, some of these upwind states have rejected RPS mandates when they believed that such policies would raise compliance costs and encourage industries to flee to less stringent states. Ironically, inconsistencies between what constitutes eligible renewable resources under state RPS

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178. *Id.*

179. *See* RICHARD CORNES & TODD SANDLER, THE THEORY OF EXTERNALITIES, PUBLIC GOODS AND CLUB GOODS 30 (2d ed. 1996).

180. Anthony DePalma, *9 States in Plan to Cut Emissions by Power Plants*, N.Y. TIMES, Aug. 24, 2005, *available at* http://www.nytimes.com/2005/08/24/nyregion/24air.html.

181. *See* Press Release, New York State Attorney General Peter C. Harvey, Eleven States Sue EPA to Block Second Mercury Rule (May 18, 2005), *available at* http://www.oag.state.ny.us/press/ 2005/may/may18d_05.html.

182. *See* Christina C. Caplan, *The Failure of Current Legal and Regulatory Mechanisms to Control Interstate Ozone Transport: The Need for New National Legislation*, 28 ECOLOGY L.Q. 169 (2001).

foster situations where states rich in cheap renewable resources end up paying to import more expensive renewable energy from neighboring states. This "gaming" produces inequities between states and discourages the development of the most cost-competitive forms of renewable energy.

A. State Programs Create Geographic Barriers

During debate over the state's impending RPS, the non-partisan Washington Policy Center claimed that the inconsistencies between state RPS mandates within the region created opportunities to shift energy between states to meet different requirements.[183] Because I-937 excluded hydro-power as a "renewable energy," but other state RPS mandates included it, Washington's low-cost hydro-power would be sold to ratepayers in neighboring states, while Washington consumers would be forced to buy higher-cost renewable energy (or RECs) from generators outside the state:

> Currently, [many] states have some sort of renewable energy portfolio requirement. The standards for what counts as "renewable" varies among them. The difference in those standards, and between states with energy quotas and those without, increases the likelihood that states will shift energy around to meet targets in states with renewable portfolios. In short, states without energy portfolios will sell their high-cost renewable energy to Washington State and will receive, in exchange, low-cost hydro or other energy for their own purposes. This amounts to a subsidy of energy prices in other states. That subsidy would be paid by all Washington residents, meaning that low- and middle-class families in Washington would pay to reduce energy costs for wealthier families in other states.[184]

Tony Usibelli—Director of the Energy Policy Division of Washington's Department of Community, Trade, and Economic Development—confirmed that there was nothing in the new Washington regulations that would prevent RECs derived from Washington State hydro-power from being exported out of the state to meet RPS requirements in any of the fourteen states and two Canadian provinces in the Western Interconnection's GIS system—including Alberta, Arizona, British Columbia, California, Colorado, Idaho, Montana, Nebraska, Nevada, New

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183. TODD MYERS, WASH. POL'Y CTR., A GUIDE TO INITIATIVE 937 11 (2006), *available at* http://www.washingtonpolicy.org/Environment/Initiative937brief.pdf.

184. *Id.*

Mexico, Oregon, South Dakota, Texas, Utah, and Wyoming.[185]

In other regions of the United States, inconsistencies in the eligibility of low-cost geothermal power create a similar situation. For example, Nevada and New Mexico's RPS mandates permit geothermal power.[186] However, Arizona's RPS mandate excludes it.[187] This inconsistency gives rise to a scenario in which Arizona's geothermal generation may be exported to neighboring states, while Arizona's regulated utilities must either purchase more expensive solar, wind and biomass to meet the state's mandate or accept non-attainment of the RPS goal. Indeed, Arizona's Cost Evaluation Working Group ("CEWG"), a committee mandated by the legislation to assess the cost benefits of the state's RPS, concluded that the goal of 1.1% of retail sales would not be met with RPS-eligible technologies, despite the declining cost of solar installations.[188]

Even in states with consistent eligibility criteria, geographical limitations and restrictions on "unbundled" renewable energy credits create incentives for low-cost renewable energy to be exported to states whose utilities face more difficult and expensive RPS compliance burdens. For example, Joseph Visalli, of the New York State Energy and Research Development Authority ("NYSERDA"), recently asserted that generators in New York were in the process of installing over 300 MW of new wind capacity upstate solely for the purpose of exporting it to Massachusetts, where utilities pay top dollar to meet that state's aggressive RPS goals.[189]

A national RPS would prevent these kinds of predatory trade-offs by creating a uniform definition of eligible renewable fuels and by fostering consistent regulatory criteria. A federal mandate would allow renewable resources in every state to compete fairly with higher-cost electricity wherever its

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185. Author Notes, EUCI 3rd Annual RPS Conference, *supra* note 67.

186. COMM'N FOR ENVTL. COOPERATION, WHAT IS RENEWABLE? A SUMMARY OF ELIGIBILITY CRITERIA ACROSS 27 RENEWABLE PORTFOLIO STANDARDS 4 (2003), *available at* http://www.cec.org/files/pdf/ECONOMY/What-is-Renewable_EN.pdf.

187. On Nov. 14, 2006, the Arizona Corporation Commission ("ACC") adopted final rules to expand the State's Renewable Energy Standard ("RES") to include geothermal electric and geothermal heat pumps. Database of State Incentives for Renewables & Efficiency, Arizona Incentives for Renewables and Efficiency, http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=AZ03R&state=AZ&CurrentPageID=1&RE=1&EE=1 (last visited June 4, 2008). However, Commissioner Kris Mayes confirmed that the new standard had not been implemented because it awaited final approval by the Office of the Arizona Attorney General as of publication of this report.

188. RENEWABLE ENERGY POL'Y PROJECT, CASE STUDY: ARIZONA 1 (2003), http://www.crest.org/articles/static/1/binaries/Arizona%20Case%20Study.pdf.

189. Author Notes, EUCI 3rd Annual RPS Conference, *supra* note 67.

generation is most expensive and diminish the market distortions wrought by state regulatory interventions

By expanding the renewable energy market to mirror the interstate nature of the wholesale electricity market, a national RPS promotes fairer competition *among* renewable generators as well as between renewable generators and *other* technologies. Low-cost geothermal energy in Arizona, for example, would compete with solar generation in Nevada. Inexpensive hydropower in Washington State would compete freely with natural gas-fired generation in Wyoming. Ratepayers in states with low-cost renewable resources would directly benefit, and price signals would flow unencumbered by the barricades erected at state lines.

B. Avoiding Costly Environmental Litigation

In many states, ambiguities within RPS statutes and unclear expiration targets have created confusion among regulated utilities, resulting in protracted and expensive lawsuits. In Massachusetts, a vague definition of "renewable resources" precipitated legal battles over whether hydroelectric facilities were included in the standard.[190] In New Mexico, ambiguity over whether the State's RPS applied to preexisting or newly developed renewable energy technologies prompted a lawsuit from El Paso Electric that went all the way to the New Mexico Supreme Court.[191]

A particularly ugly legal battle arose from one utility's claim that Iowa's RPS mandate was inconsistent with an existing federal statute. In 1984, MidAmerican Energy Company, the largest investor-owned utility in the State, challenged the legality of Iowa's RPS mandate on the grounds that it obligated the utility to purchase power from renewable energy facilities at rates in excess of the avoided cost set by the federal Public Utility Regulatory Policies Act ("PURPA").[192] MidAmerican and the State of Iowa spent fifteen years and countless dollars locked in a heated legal battle before settling in 1999 in the utility's favor.[193]

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190. Rader, *supra* note 28, at 394, 401.

191. Ben Neary, *El Paso Electric Sues New Mexico Over Energy Rule*, SANTA FE NEW MEXICAN, Mar. 11, 2003, at B1.

192. *See Midwest Power Sys., Inc.*, 78 F.E.R.C. ¶ 61,067 (1997).

193. *See* Brent Gale, Vice President of Legislation & Regulation, MidAmerican Energy, Presentation to the Iowa Pub. Utils. Comm'n: Renewable Energy Requirements and Net Billing—Lessons Learned from Iowa (2000) (on file with author); *Iowa Governor's Energy Policy Task Force Meeting Minutes* 7 (Apr. 3, 2001) (statement of Brent Gale, Vice President of Legislation & Regulation, MidAmerican Energy), *available at* http://www.iowadnr.com/energy/info/taskforce/01apr03.pdf; ILL. COMMERCE COMM'N

The legal morass generated by state-based RPS strategies also can discourage renewable energy investments by creating risky and unpredictable markets. While MidAmerican was busy fighting Iowa's RPS statute in court, it was not installing new renewable capacity. However, upon settlement of the dispute, the company invested roughly 10% of its entire portfolio in 568 MW of new wind energy.[194] Similarly, PacifiCorp held back on investments in nearly 1,400 MW of renewable capacity throughout the nation until the situation in Iowa was resolved.[195]

Similar delays in renewable energy investments will occur with the continued emphasis on a state-by-state approach to RPS. Indeed, MidAmerican has signaled that it is prepared to litigate against new RPS statutes in Oregon and Washington, risking uncertainties in renewable energy investments in the Pacific Northwest for years or possibly decades.[196]

Functional national markets require open trade and limited protectionist policies. This requires the federal government to prevent states from adopting protectionist or autarkic policies that would attribute a product's market share to its geographic origins rather than to market mechanisms. States are permitted to promote in-state business, but they are not permitted to protect those businesses from out-of-state competition. The courts have ruled that the Dormant Commerce Clause prohibits a state from obstructing interstate trade or placing itself in a position of economic isolation.[197] State RPS statutes that set geographic restrictions on renewable generation or otherwise

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REQUEST FOR PUBLIC COMMENT—SUSTAINABLE ENERGY PLAN FOR ILLINOIS, MIDAMERICAN ENERGY COMPANY PRELIMINARY COMMENTS (2003), *available at* http://www.icc.illinois.gov/downloads/public/en/050309ecCommentsMidAmer.pdf.

194. Telephone Interview with Brent Gale, Vice President of Legislation & Regulation, MidAmerican Energy (Feb. 20, 2007). Brent Gale stated that although the 1984 Iowa RPS remains unchanged at approximately 100 MW for the state's regulated utilities, MidAmerican has contracted for or owns 568 MW of wind—9.4% of the generation portfolio—making it the country's largest utility owner of wind energy. MidAmerican has plans for installing more. MidAmerican's sister utility, PacifiCorp, has contracted for or owns nearly 1500 MW of hydro-electric energy, 300 MW of wind energy, 26 MW of geothermal energy and 130 MW of other renewable energy resources—16% of the generation portfolio—and expects to increase its nonhydro renewable energy portfolio to 1400 MW by 2009. *Id.*

195. *Id.*

196. *Id.* Mr. Gale notes that, thus far, PacifiCorp has been able to add renewable energy within the strictures of the least cost standards of the six states that it serves. However, if those states adopt RPS percentages and schedules that fail to consider the cost to customers, the continued existence of the least cost standards may create impediments to compliance similar to the problems encountered in Iowa. *Id.*

197. SCOTT HEMPLING & NANCY RADER, AM. WIND ENERGY ASS'N, STATE IMPLEMENTATION OF RENEWABLES PORTFOLIO STANDARDS: A REVIEW OF FEDERAL LAW ISSUES 6 (1996) (quoting Maine v. Taylor, 477 U.S. 131, 151 (1986)).

limit the interstate trade of RECs may be accused of violating this central tenant of the United States Constitution ("Constitution").

Not surprisingly, utilities have demonstrated a natural proclivity for successfully challenging state regulations on dormant commerce clause grounds.[198] In 1982, New England Power Company successfully challenged a New Hampshire statute prohibiting a hydroelectric company from exporting electricity out of the state without the utility's approval.[199] In 1992, utilities in Wyoming convinced the Supreme Court to overturn an Oklahoma statute requiring the state's regulated utilities to consume a certain percentage of Oklahoma-mined coal.[200]

However, the Supreme Court's 2002 decision upholding the FERC's jurisdiction over the transmission component of retail sales may be the starkest signal yet that regulated utilities can call upon the federal government to intervene when they feel unfairly compromised by state regulations.[201] Indeed, Eisen argues that the practical implication of the Court's decision in *New York v. FERC* is that "the federal government could assert jurisdiction all the way to the consumer's toaster if it so chose."[202]

It is only a matter of time before utilities and lawmakers challenge the constitutionality of certain state RPS mandates.[203] Nevada, New Jersey, and Texas have all adopted restrictions that only count in-state renewable resources toward their respective RPS mandates.[204] Similarly, Pennsylvania, Maryland, and the District of Columbia stipulate that RPS-eligible

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198. Michael S. Greve, *Cartel Federalism? Antitrust Enforcement by State Attorneys General*, 72 U. CHI. L. REV. 99, 116 (2005).

199. *See* New England Power Co. v. New Hampshire, 455 U.S. 331, 339, 102 S. Ct. 1096, 1100–01, 71 L. Ed.2d 188 (1982) (finding that "order of the New Hampshire Commission, prohibiting New England Power from selling its hydroelectric energy outside the State of New Hampshire, is precisely the sort of protectionist regulation that the Commerce Clause declares off-limits to the states").

200. *See* Wyoming v. Oklahoma, 502 U.S. 437, 455, 112 S. Ct. 789, 800, 117 L. Ed.2d 1 (1992) (holding that the law in question unconstitutionally discriminated against interstate commerce).

201. *See* New York v. FERC, 535 U.S. 1, 122 S. Ct. 1012, 152 L. Ed. 2d 47 (2002) (upholding FERC's claim in Order 888 of jurisdiction over the transmission component of retail sales in states that have taken on the task of separating generation charges from transmission and distribution).

202. Joel B. Eisen, *Regulatory Linearity, Commerce Clause Brinksmanship, And Retrenchment In Electric Utility Deregulation*, 40 WAKE FOREST L. REV. 545, 572 (2005).

203. *See* Kirsten H. Engel, *The Dormant Commerce Clause Threat to Market-Based Environmental Regulation: The Case of Electricity Deregulation*, 26 ECOLOGY L. Q. 243 (1999); Steven Ferrey, *Renewable Orphans: Adopting Legal Renewable Standards at the State Level*, 19 ELEC. J. 52, 52–53 (2006); HEMPLING & RADER, *supra* note 197, at 6.

204. Ferrey, *supra* note 203, at 55.

renewable resources must come from within the "PJM"—Pennsylvania, New Jersey, and Maryland—service territory.[205] In the Pacific Northwest, RECs can be sold only among the fourteen members of the Western Renewable Energy Generation Information System.[206]

Some states have gone so far as to devalue RECs from other states. For example, California's RPS requires RECs to be bundled with the electricity generated from renewable resources, which has the practical effect of restricting unbundled RECs from other states.[207] Even the California Public Utilities Commission has warned state policymakers that their position on out-of-state RECs may be constitutionally questionable.[208]

If a state RPS was found to violate the Dormant Commerce Clause, the practical effect would be its immediate repeal. While state legislatures could try to craft a RPS that would pass constitutional muster or appeal to a higher court, one successful challenge would be enough to risk a cascade of copy-cat litigation pursued by regulated entities piggy-backing on judicial precedent. In any event, the result is a risky and unpredictable regulatory environment threatening the longevity of state-based RPS mandates and the long-term stability of the nation's renewable energy market.

C. Promoting Cleaner Water, Air, and Land

In addition to avoiding free riders, minimizing gaming between states, and mitigating the risk of litigation, a national RPS would diversify the country's electricity portfolio with cleaner, less polluting technologies. Indeed, examinations of fuel generation in several states confirm that RPS policies displace more polluting generators, such as those powered by oil, natural

205. Willing, *supra* note 33. In addition to Pennsylvania, Maryland, New Jersey, from which it gets its name, PJM also covers parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District of Columbia. PJM, Territory Served, http://www.pjm.com/about/territory-served.html (last visited June 4 2008).

206. Tony Usibelli, Presentation at the 3rd Annual Renewable Portfolio Standards Conference: Washington State's Energy Independence Act (Initiative 937)—A Bit of a Different Animal (2007).

207. Ryan Wiser et al., *Does it Have to be This Hard? Implementing the Nation's Most Complex Renewables Portfolio Standard*, 18 ELEC. J. 55, 60 (2005) [hereinafter *Does it Have to be This Hard?*].

208. *See* ANDREW SCHWARTZ, CAL. PUB. UTIL. COMM'N, RENEWABLE ENERGY CERTIFICATES AND THE CALIFORNIA RENEWABLES PORTFOLIO STANDARD PROGRAM 21, 75 (2006), *available at* http://docs.cpuc.ca.gov/published/Report/55606.htm. It should be noted, however, that California's stance on REC unbundling may be changed under PUC proceeding expected to start in mid-2007. Additionally, California's stance on REC unbundling may be changed under PUC proceeding expected to start in mid-2007.

gas, coal, and uranium.

The New York State Energy and Research Development Authority ("NYSERDA") looked at load profiles for 2001 and concluded that 65% of the energy displaced by wind turbines in New York would have otherwise come from natural gas facilities; 15% from coal-fired plants; 10% from oil-based generation; and 10% from out of state imports of electricity.[209] A more recent study conducted in Virginia found that the electricity mandated by a state RPS would otherwise be generated with a mix of 87% coal; 9% natural gas; and 4% oil.[210] A 20% RPS by 2020 in Michigan would displace the need for more than 640 MW of power that would have otherwise come from both nuclear and coal facilities.[211] Utilities in Ontario, Canada are deploying renewable energy systems in an attempt to entirely displace coal-fired electricity generation in the region.[212]

By offsetting the generation of conventional and nuclear power plants, a national RPS avoids many of the environmental and social costs associated with the mining, processing, transportation, combustion and clean-up of fossil and nuclear fuels.

Perhaps the most important and least discussed advantage to a federal RPS is its ability to displace water-intensive electricity generation. The nation's oil, coal, natural gas, and nuclear facilities consume about 3.3 billion gallons of water each day[213] and accounted for almost 40% of all freshwater withdrawals.[214] With electricity demand expected to grow by approximately 50% in the next 25 years, continued reliance upon fossil fuel-fired and nuclear generators could spark a water scarcity crisis.[215] In 2006, the Department of Energy warned that if new power plants continue to be built with evaporative cooling systems, consumption of water for electricity production

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209. GE ENERGY & ENERGY CONSULTING, THE EFFECTS OF INTEGRATING WIND POWER ON TRANSMISSION SYSTEM PLANNING, RELIABILITY, AND OPERATIONS 14 (2005), *available at* http://www.nyserda.org/publications/wind_integration_report.pdf.

210. HATHAWAY, *supra* note 58, at 21.

211. Benjamin K. Sovacool, *State Efforts to Promote Renewable Energy: Tripping the Horse with the Cart?*, VIII SUSTAINABLE DEV. LAW & POL'Y 1 (2007), *available at* http://vlex.com/vid/457638 (citing Clean Energy Testimony: Hearing Before the Mich. State Senate Technology & Energy Committee (2006) (statement of Mike Shriberg)).

212. RYAN G. LITTLE & BAS C. VAN BERKEL, AN OVERVIEW OF RENEWABLE ENERGY IN ONTARIO 5–6 (2006), *available at* http://www.stormfisher.com/REOntario.pdf.

213. U.S. DEP'T OF ENERGY, ENERGY DEMANDS ON WATER RESOURCES: REPORT TO CONGRESS ON THE INTERDEPENDENCY OF ENERGY AND WATER 19 (2006), *available at* http://www.netl.doe.gov/technologies/coalpower/ewr/pubs/
DOE%20energy-water%20nexus%20Report%20to%20Congress%201206.pdf.

214. *Id.* at 17.

215. *Id.* at 10, 50.

could more than double by 2030 to 7.3 billion gallons per day.[216] This staggering amount is equal to the entire country's water consumption in 1995.[217]

By promoting wind, solar, and other renewable resources that do not consume or withdraw water, a national RPS can help conserve this essential yet dwindling resource. In one of the most comprehensive assessments of renewable energy and water consumption, the American Wind Energy Association estimated that wind power uses less than 1/600 as much water per unit of electricity produced as does nuclear; 1/500 as much as coal; and 1/250 as much as natural gas.[218]

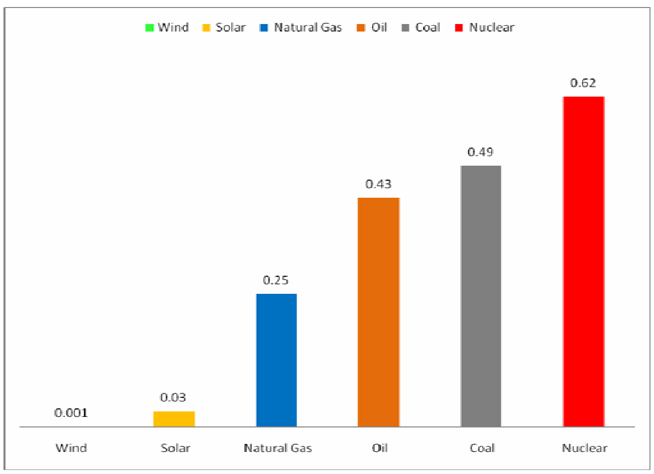

Figure 4: Water Consumption for Conventional and Renewable Power Plants in California (Gallons/kWh)

Conventional electricity generation is by far the largest source of air pollutants that harm human health and contribute to global warming. In 2003, for example, fossil fuel use—for all energy sectors, not just electricity—was responsible for 99% of the country's carbon dioxide ("CO_2") emissions, 93% of its SO_x emissions, and 96% of its NO_x emissions.[219] Researchers at the Harvard School of Public Health estimated that the air pollution from conventional energy sources kills between 50,000 and

216. *Id.* at 10–11.

217. *Id.* at 11.

218. *See* AM. WIND ENERGY ASS'N, WIND ENERGY AND THE ENVIRONMENT, http://www.awea.org/faq/wwt_environment.html (last visited June 4, 2008) [hereinafter WIND ENERGY AND THE ENVIRONMENT].

219. Benjamin K. Sovacool, Presentation at the 2006 Choices & Challenges Forum at Va. Tech: The Energy-Environment Nexus 3 (Nov. 2, 2006) (on file with author).

70,000 Americans every year.[220] These researchers found that the emissions from just nine power plants in Illinois directly contributed to an annual risk of 300 premature deaths, 14,000 asthma attacks, and more than 400,000 daily incidents of upper respiratory symptoms among the 33 million people living within 250 miles of the plants.[221]

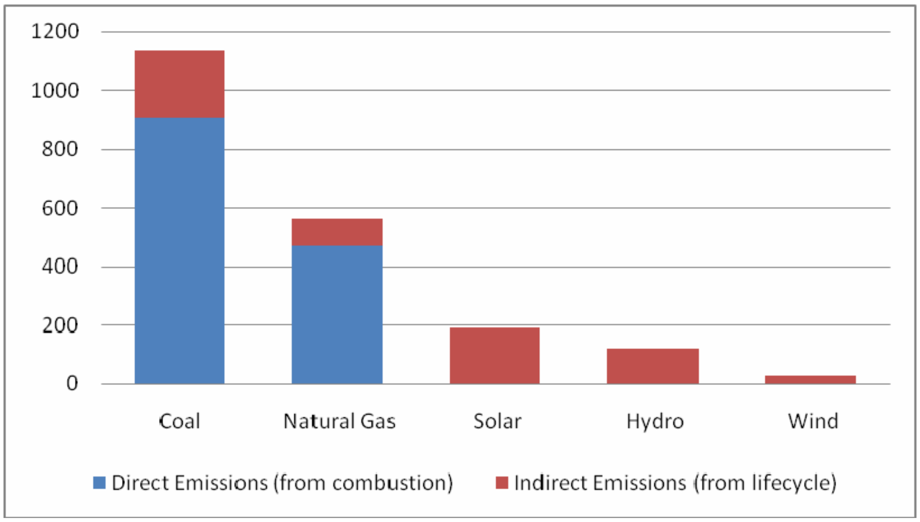

Figure 5: Direct and Indirect Carbon Emissions by Electricity Technology (equivalent grams of CO_2/kWh)[222]

The International Atomic Energy Agency estimates that when direct and indirect carbon emissions are included, coal plants are about five times more carbon intensive than solar and more than 140 times more carbon intensive than wind technologies.[223] Natural gas fares little better, at three times as

220. Press Release, Harvard Sch. of Public Health, Air Pollution Deadlier Than Previously Thought (Mar. 2, 2000), http://www.hsph.harvard.edu/news/press-releases/archives/2000-releases/ press03022000.html.

221. Jonathan Levy, Sc.D. & Jack Spengler, Ph.D., *Health Benefits of Emissions Reductions from Older Power Plants*, 9 RISK IN PERSPECTIVE 1, 3 (2001), *available at* http://www.hcra.harvard.edu/rip/risk_in_persp_April2001.pdf; Press Release, Harvard Sch. of Public Health, Impact of Pollution on Public Health (2001), http://www.hsph.harvard.edu/press/releases/press01032001.html.

222. *House of Commons, Select Committee on Environmental Audit: Memorandum Submitted by Malcolm Grimston* (Sep. 1, 2005), *available at* http://www.publications.parliament.uk/pa/cm200506/cmselect/cmenvaud/584/ 584we34.htm.

223. Joseph V. Spadaro, Lucille Langlois & Bruce Hamilton, *Greenhouse Gas Emissions Of Electricity Generation Chains: Assessing The Difference*, 42 IAEA BULLETIN 19, 21 fig. (2000), *available at* http://www.iaea.org/Publications/Magazines/Bulletin/Bull422/article4.pdf. Emissions from both lignite and coal amount to about 366 grams CO_2 per kWh. *Id.* On the other

carbon intensive as solar and twenty times as carbon intensive as wind.[224] The Common Purpose Institute estimates that renewable energy technologies could offset as much as 0.49 tons of CO_2 emissions per every MWh of generation.[225] According to data compiled by the Union of Concerned Scientists, a 20% RPS would reduce CO_2 emissions by 434 million metric tons by 2020—a reduction of 15% below "business as usual" levels, or the equivalent to taking nearly 71 million automobiles off the road.[226]

In addition to the environmental damage caused by fossil fuel combustion, the production of fossil fuels and uranium—including drilling, mining, processing and transportation—produce a substantial amount of pollution and toxic waste.[227] In the United States, there are more than 150 refineries; 4,000 offshore platforms; 410 underground gas storage fields; 160,000 miles of oil pipelines; and 1.4 million miles of natural gas pipelines.[228] Additionally, nuclear waste is spread across 121 storage facilities in 39 states.[229] Each can degrade their surrounding environment and negatively affect the health and safety of Americans.[230]

In contrast, recent advances in renewable energy technologies have made these technologies much less land-intensive. The Worldwatch Institute recently estimated that harnessing renewable energy for electricity production requires less land than conventional systems.[231] The study noted that

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hand, wind power statistics from the United Kingdom and Belgium show emissions of 2.5 grams CO_2 per kWh, while statistics for solar energy put emissions rates at around 76.4 grams CO_2 per kWh. *Id.*

224. *Id.*

225. The Common Purpose Inst., Value Added Benefits ("Value Chain") of Growing Energy Crops on Degraded Mining Land, http://www.treepower.org/valuechain/main.html (last visited June 4, 2008).

226. UNION OF CONCERNED SCIENTISTS, RENEWING AMERICA'S ECONOMY: A 20 PERCENT NATIONAL RENEWABLE ELECTRICITY STANDARD WILL CREATE JOBS AND SAVE CONSUMERS MONEY 1–2 (2004), *available at* http://www.ucsusa.org/clean_energy/renewable_energy_basics/renewing-americas-economy.html (follow "Download Renewing America's Economy (PDF)" hyperlink).

227. *See* Spadaro, Langlois, & Hamilton, *supra* note 222, at 21.

228. Daniel Yergin, *Ensuring Energy Security*, 85 FOREIGN AFFAIRS 69, 78 (2006), *available at* http://www.un.org/ga/61/second/daniel_yergin_energysecurity.pdf; Rob Hopkins, *ASPO 5: Dennis Meadows — Peak Oil and Limits to Growth*, ENERGY BULLETIN, July 19, 2006, http://www.energybulletin.net/19773.html.

229. OFFICE OF CIVILIAN RADIOACTIVE WASTE MGMT., U.S. DEP'T OF ENERGY, WHAT ARE SPENT NUCLEAR FUEL AND HIGH-LEVEL RADIOACTIVE WASTE (2007), http://www.ocrwm.doe.gov/factsheets/doeymp0338.shtml.

230. *See, e.g.*, *id.* (noting that "[n]uclear waste must be properly managed to minimize risk to the environment and to the health and safety of future generations").

231. WORLDWATCH INST. CTR. FOR AM. PROGRESS, *supra* note 129, at 20.

solar power plants that concentrate sunlight in desert areas, for instance, require 2,540 acres per billion kWh.[232] Moreover, the institute indicated that "[o]n a lifecycle basis, this is less land than a comparable coal or hydropower plant generating the same amount of electricity."[233] Similar projections from the National Renewable Energy Laboratory ("NREL") demonstrate that solar and wind technologies use extensively *less* land than conventional systems when their complete fuel cycles are considered.[234]

Technology	Capacity Factor	Land (km^2) per year
Flat-Plate Photovoltaics	20%	10 to 50
Solar Thermal	25%	20 to 50
Wind	20%	100
Traditional Coal Fired	85%*	100 (using open cut coal mine)**

Table 2: Comparative Land Use for Renewable and Coal Technologies per installed GW
Source: National Renewable Energy Laboratory (NREL), 2004,[235] National Energy Technology Laboratory, 2007,[236] and **Diesendorf, 2006[237]

The American Wind Energy Association ("AWEA") estimates that in open and flat terrain a large-scale wind plant will require about sixty acres per MW of installed capacity.[238] However, AWEA emphasizes that only 5%—three acres—or less of this area is actually occupied by turbines, access roads, and other equipment.[239] 95% remains free for other compatible uses such

232. *Id.*

233. *Id.*

234. *See, e.g.*, NAT'L RENEWABLE ENERGY LAB., RENEWABLE ENERGY AND LAND USE (2004), *available at* http://www.nrel.gov/docs/fy04osti/35097.pdf.

235. NAT'L RENEWABLE ENERGY LAB., U.S. DEP'T OF ENERGY, PV FAQS (2004), *available at* http://www.nrel.gov/docs/fy04osti/35097.pdf.

236. *See* NAT'L ENERGY TECH. LAB., SUBCRITICAL PULVERIZED BITUMINOUS COAL PLANT 1 (2007), *available at* http://www.netl.doe.gov/energy-analyses/pubs/deskreference/B_PC_SUB_051507.pdf.

237. MARK DIESENDORF, UNIV. OF NEW S. WALES, REFUTING FALLACIES ABOUT WIND POWER 3 (2006), *available at* http://www.ceem.unsw.edu.au/content/userDocs/RefutingWindpowerFallacies.pdf.

238. WIND ENERGY AND THE ENVIRONMENT, *supra* note 218. This drops to as little as two acres per MW for hilly terrain. *Id.*

239. *Id.*

as farming or ranching.[240] For example, at the High Winds Project in Solano, California, 6,000 acres of leased land host ninety separate 1.8 MW wind turbines that total 162 MW of electricity capacity.[241] However, the "[t]urbines do not take up much land, and generally do not interfere with daily operations. Crops can be grown and livestock grazed right up to the base of the machine."[242]

V. LESSONS FOR THE DESIGN OF A NATIONAL RPS

We have noted how vague definitions of regulated utilities provoked several prolonged legal battles in some states. In others, overly broad definitions of eligible resources resulted in programs that have not supported new renewable generation. In crafting a federal RPS mandate, eight lessons can be learned from the experience of several states over the past two decades.

A. The RPS Target Must Be Large Enough to Create Economies of Scale, but Phased in Gradually to Protect Utilities

To bring the benefits of renewable energy to most consumers, a national RPS must set a target large enough to achieve economies of scale in manufacturing. For example, various economic studies discussed above have found significant benefits from a mandate for 20% RPS by 2020.

If the target is not set large enough, it may fail to promote renewable energy technologies at all. The clearest example of a state RPS that has failed to produce new renewable energy is Maine. The Maine legislature passed a RPS that took effect in March of 2000, setting an immediate and seemingly large target of 30% and including large hydroelectric facilities as an eligible resource.[243] However, existing hydroelectric, biomass, and landfill gas generators in the state were already exceeding the standard.[244]

NREL analysts concluded that Maine's RPS "failed to lead to any new renewable resources, and has failed to generate

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240. *Id.*

241. EDAW, SOLANO COUNTY GENERAL PLAN UPDATE 3-9 (2006), *available at* http://www.solanocountygeneralplan.net/Background%20Docs/3_Energy.pdf; *see also* FPL ENERGY, HIGH WINDS ENERGY CENTER, http://www.fplenergy.com/portfolio/pdf/highwinds.pdf (last visited June 4, 2008).

242. EDAW, *supra* note 241, at 3-19.

243. ME. PUB. UTILS. COMM'N, REPORT AND RECOMMENDATIONS ON THE PROMOTION OF RENEWABLE RESOURCES 3 n.3, 27–30 (2004), *available at* http://maineghg.raabassociates.org/Articles/PUC_DraftRPSReport.pdf.

244. *Id.*

significant revenues above commodity electricity market prices."[245] Even the Maine Public Utilities Commission admitted that "the experience to date, however, reveals that the current portfolio requirement is not satisfying the Restructuring Act's stated policy of encouraging the promotion of new renewable energy resources."[246]

In contrast, Nevada's RPS set the target level *above* the state's existing level of renewable generation, creating an incentive for utilities to expand their deployment of renewable technologies. The State passed one of the more aggressive RPS statutes in 2001, requiring that load-serving entities provide 5% of their electricity from renewable resources in 2003 but also that they increase renewable generation to 15% by 2013.[247] Sierra Pacific and Nevada Power held their first solicitation for renewable energy in late 2001 and received forty-nine bids at very competitive prices for 4,300 MW of eligible power, including 3,000 MW of wind; 385 MW of solar; and 784 MW of geothermal.[248] By making its targets large enough, the statute successfully promoted new renewable energy development. Most recently, for instance, Nevada Power signed a seventeen-year power purchase agreement to build an 85.5 MW wind site to contribute renewable energy toward its state RPS mandate.[249]

Another key feature of successful state RPS statutes is that they set gradual benchmarks toward reaching the final target. Gradual yet specific benchmarks—such as 6% by 2008; 7% by 2009; 9% by 2012; 14% by 2015; 17% by 2018; 20% by 2020; 23% by 2023; and 25% by 2025—provide transmission and system operators with time to adjust and implement programs to ensure system reliability.

The initial target size should also be set at slightly below the level of existing capacity for the first year, giving suppliers time to arrange contracts. For example, if a national standard were to include hydroelectric facilities, it could set the standard at 6% for 2008, because the country already provides slightly more than 6% of its capacity using renewable energy such as hydroelectric. RPS targets that step-up deployment percentages would

245. BOB GRACE, RYAN WISER, & MARK BOLINGER, RENEWABLE PORTFOLIO STANDARDS: BACKGROUND AND ANALYSIS FOR NEW YORK STATE 3 (2002), *available at* http://www.dps.state.ny.us/rps/rpsbackgroundpaper.pdf.

246. ME. PUB. UTILS. COMM'N, *supra* note 243, at 4–5.

247. Pew Ctr. on Global Climate Change, State and Local Net Greenhouse Gas Emissions Reduction Programs, http://www.pewclimate.org/states.cfm?ID=47 (last visited June 4, 2008).

248. GRACE, WISER, & BOLINGER, *supra* note 245, at 5.

249. *Id.*

gradually give power providers time to inventory their resources and adjust their system management.

Furthermore, by increasing the amount of renewable energy slowly over time, the standard ensures that the renewable energy market will result in competition, efficiency, and innovation that will, in turn, deliver renewable energy at the lowest possible cost. A gradual phase-in provides time to set up standards for credit certification, monitoring, and compliance. It creates relative certainty and stability in the renewables market by enabling long-term contracts and financing for the renewable power industry, thereby lowering costs. Moreover, it gives utilities and generation companies incentive to drive down the cost of renewables in order to reduce their RPS compliance costs.[250]

California provides an excellent example of how a gradual phase-in makes a RPS more effective. When California implemented their RPS in 2002, they required investor-owned utilities, energy service providers, and community choice aggregators to meet 20% of their electricity load with renewable resources by 2017.[251] To reach the target, the California RPS also obligated each utility to increase the percentage of its load with renewable energy by 1% each year.[252]

The gradual phase-in clearly worked. The state's three major investor-owned utilities increased their purchase of renewable energy from 19,190 GWh in 2002 to 23,110 GWh in 2005.[253] From 2002 to 2005, Pacific Gas & Electric ("PG&E"), Southern California Edison, and San Diego Gas & Electric each increased the percentage of their load served by renewable energy by approximately 1%, 1.5%, and 4.5%, respectively.[254] In 2003, the state boasted more than 1,900 MW of wind and 600 MW of biomass, largely induced by phase-in targets set to meet the state's aggressive RPS goal.[255]

In total, approximately 1,452 to 2,789 MW of new renewable energy capacity are already approved or awaiting approval, with more to come.[256]

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250. THE RENEWABLES PORTFOLIO STANDARD: HOW IT WORKS AND WHY IT'S NEEDED, *supra* note 13.

251. CAL. PUB. UTIL. CODE §§ 399.11–399.20 (West 2007).

252. *Id.* § 399.15.

253. *Does It Have To Be This Hard?, supra* note 207, at 56.

254. *Id.*

255. *See infra* Figure 6.

256. *See Does it Have to Be This Hard?*, *supra* note 207, at 56.

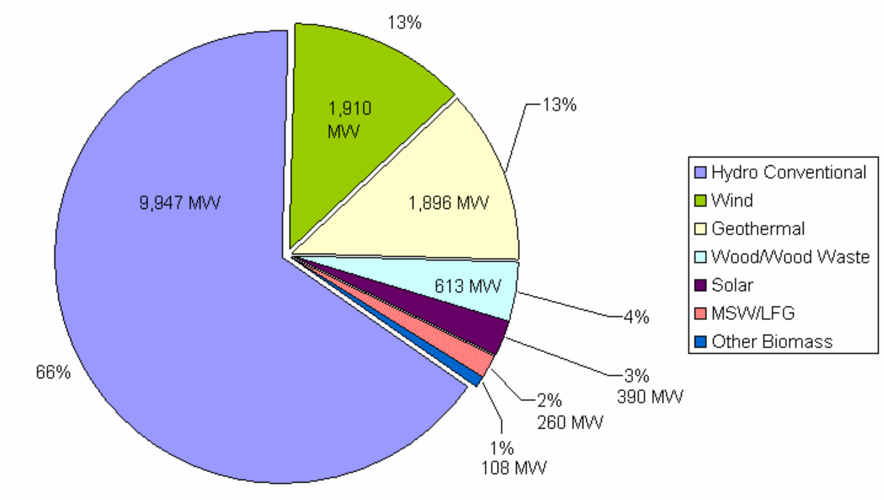

Figure 6: California Renewable Energy Capacity by Source, 2003
Source: U.S. Energy Information Administration, 2005

B. Definitions of Eligible Renewable Resources Must Be Clear, Consistent, and Comprehensive

A national RPS should include all renewable resources and should discriminate against none. The definition of eligible renewable resources could be based on the renewable aspects of the fuels used, rather than any particular technologies deployed. For instance, eligible resources could be defined as: *Any electrical generator that creates electricity from sunlight, wind, falling water, renewable plant or animal material, and/or natural geothermal sources*. A fuel-based definition does not rely on policymakers to determine the forms of technology that should receive market preference and does not require policymakers to continuously revise the mandate to include new technology that may be developed.

By including both new and existing generators as eligible resources, a national RPS would avoid bitter debates concerning whether certain "upgrades" to existing systems make them "new," as with the feud over New Source Review under the Clean Air Act.[257] Gradual benchmarks ensure that new renewable

257. Established as a part of 1977 Clean Air Act amendments, National Source Review ("NSR") is a "preconstruction permitting program" designed by Congress to serve two main purposes. U.S. Envtl. Prot. Agency, EPA New Source Review, http://www.epa.gov/NSR (last visited June 4, 2008). First, it ensures that air quality is not degraded from addition of new or modified industrial pollutants;. *Id.* Second, it assures residential neighbors of new or modified large industrial facilities that industrial

generation is developed without having to distinguish between "existing" and "new" renewable energy systems. Avoiding this debate reduces administrative complexity and frees generators from continuously monitoring regulatory rulings to determine whether a particular expenditure will be considered maintenance and refurbishment of an existing facility or a new investment that qualifies toward the RPS mandate.

A fuel-based definition of eligible resources would include large hydroelectric facilities. The construction of new hydroelectric facilities and incremental improvements to existing ones could help utilities to use renewable resources to provide base-load power. Including incremental hydropower also allows areas like the Southeast and the Pacific Northwest to benefit from their regions' substantial sources of existing clean energy.

Finally, a fuel-based definition of eligible resources would ensure that truly renewable resources attain a greater proportion of the nation's electricity fuel portfolio. While alternative technologies such as non-renewable distributed generation, clean coal with carbon capture and storage, and energy efficiency should be encouraged, there are strong market-based reasons why they should not be directly included in a RPS. Such sources would neither diversify energy resources nor achieve the economic benefits of a vibrant renewable energy sector. Renewables should compete with other renewables, just as clean coal should compete with dirty coal and light water reactors with advanced nuclear generators. Healthy market-based competition ensures that the best mechanisms for utilizing each fuel source are supported.

C. A National RPS Should Apply to Electricity Demand, Not Installed Capacity

Rather than mandate a fixed amount of renewable capacity, a national RPS should require utilities to meet a percentage of electricity demand through renewable resources. A demand-based mandate ensures that suppliers are concerned more with the actual delivery of electricity than the construction of renewable energy systems that may never produce a watt of energy actually used by consumers.

Setting the RPS as a function of electricity demand also provides utilities with an incentive to pursue cost effective

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sources will be as clean as possible, and that industrial expansion will be accompanied by advancements in pollution control. *Id.* For discussions of NSR problems and improvement, see U.S. Envtl. Prot. Agency, New Source Review Fact Sheet, http://www.epa.gov/nsr/facts.html (last visited June 4, 2008).

demand-side management and energy efficiency strategies as a way of reducing electricity demand and, consequently, the total compliance level. For instance, if a utility had to meet 20% of its electricity sales with eligible renewable resources and worried that it could not affordably generate enough renewable electricity or purchase enough credits, it could first pursue aggressive energy efficiency and demand-side management strategies in an effort to lower sales and reduce the total amount of renewable generation needed to comply with the standard. A demand-based RPS is an elegant way of including energy conservation in the mandate while adding a level of flexibility in meeting RPS targets.

D. A National RPS Should Apply Equally to All Retail Power Providers

Some state-based RPS statutes initially excluded some power providers in an attempt to protect certain types of utilities.[258] In practice, the attempt to carve out exemptions through imprecise statutory language created confusion and uncertainty for regulated entities.[259] In Connecticut, the state's RPS exempted default service providers, creating speculation among all of the state's regulated utilities that the law would not be enforced at all.[260] Also, in Washington utilities with no load growth are exempted from the state's RPS mandate; accordingly, if portions of the state experience decreased population growth or diminished electricity demand, load-serving entities would be absolved from their regulatory burden entirely.[261]

Applying the standard to *all* retail power providers—including investor owned utilities, publicly owned utilities, municipalities, and rural electric cooperatives—creates an equal playing field and avoids creating inconsistencies in regulation. Requiring all retail providers to meet the mandate reduces opportunities for "free riders" within the electricity sector. Regulated utilities, which pay to clean air and conserve water, would not be required to subsidize the generation of dirty, low-cost, and non-renewable electricity from exempt generators.

A standard applying to all providers also creates better economies of scale and ultimately helps drive down the cost of renewable generation for all suppliers. By applying the mandate uniformly and without exemption, a national RPS avoids the

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258. *See* Rader, *supra* note 28, at 394.
259. *See id.*
260. *Id.* at 394.
261. Usibelli, *supra* note 206.

kind of regulatory unpredictability that initially plagued Connecticut's program.

E. A National RPS Must Establish Uniform Rules for Trading Renewable Energy Credits

Absent a REC trading scheme, verifying the compliance of a national RPS would require tracking all renewable energy transactions within an entire trading region, which is an enormously complicated—perhaps impossible—task. Moreover, REC tracking would not follow the actual delivery of power, because "most states share electricity generation transmission and distribution infrastructure and cannot ensure that all of the renewable electricity that they use will be generated in-state."[262]

A national REC trading market would provide utilities with immense flexibility in meeting the standard. To comply with the federal mandate, utilities could either generate their own renewable electricity, purchase unbundled credits from renewable generators anywhere in the nation, or import electricity bundled with renewable credits from wherever practicable.

Utilities located in areas with poor renewable resources would not be punished because they have the ability to invest in energy generation in resource-rich areas. A robust REC trading market also allows credits derived from intermittent technologies such as wind and solar to be sold at any time, regardless of when the power was generated.[263]

Massachusetts provides an excellent example of how a vibrant REC trading mechanism is instrumental to the success of a RPS. In 2004, Massachusetts utilities required to meet the state RPS could only generate 486,000 MWh from qualified renewable resources: 60% of the standard was met by landfill gas generation; 35% from biomass; 4% from anaerobic digestion; and around 1% from wind.[264] Unexpected delays in the Cape Wind Project in Nantucket Sound, revisions to the state's definition of eligible biomass, and uncertainty over the federal production tax credit unexpectedly hindered renewable energy development and created an unanticipated shortfall in renewable generation.[265]

Rather than scrapping the mandate or forcing utilities to

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262. BARRY G. RABE, RACE TO THE TOP: THE EXPANDING ROLE OF U.S. STATE RENEWABLE PORTFOLIO STANDARDS 8 (2006), *available at* http://www.pewclimate.org/docUploads/ RPSReportFinal.pdf.

263. *See* Rader, *supra* note 28, at 403.

264. MASS. OFFICE OF CONSUMER AFFAIRS & BUS. REGULATION, *supra* note 105, at 6.

265. *Id.* at 11.

pay hefty non-compliance fees, the Massachusetts statute permitted power providers to import RECs—265,000 MWh of them in 2004—to meet their compliance obligations.[266] By allowing utilities to trade RECs, the state RPS ensured that the standard was met and that utilities invested in new clean electricity generation that benefits Massachusetts and the nation. The shortfall also signaled to investors the strong market for renewable generation and encouraged rapid development of in-state renewable resources to offset future shortfalls.[267]

F. A National RPS Should Have Flexible Compliance Rules, but Aggressive Penalties for Non-Compliance

To deter utilities wishing to escape RPS obligations, any national standard must have penalties for noncompliance equal to several times the market price of renewable energy credits. A noncompliance penalty is needed not just to achieve more renewable generation but also to reduce aggregate compliance costs. This is because, in part, investors will base their renewable energy commitments on the certainty that a market will exist for their product. Automatic penalties imposed for each required tradable credit that retailers fail to produce will give investors confidence that there will be potential buyers for renewable electricity and unbundled RECs.[268]

Failure to create strict noncompliance penalties runs the risk of creating a "Catch-22" situation where utilities make an insincere effort to obtain renewables from potential suppliers, and then—when no renewables are built—claim that there are no renewables available. Policymakers could then view the utility's noncompliance as being in good faith because there were no renewable energy technologies available for purchase, rather than seeing the situation as proof that the utility never intended to comply.[269]

An aggressive non-compliance penalty becomes self-enforcing and avoids the need to resort to costly administrative and investigative measures.[270] Such a program could be modeled after the federal SO_2 allowance-trading program, under which an automatic $2,000 per ton penalty, indexed to inflation, is imposed

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266. *Id.* at 1.
267. *Id.*
268. *See* Rader, *supra* note 28, at 393–94, 398.
269. *See* Rader, *supra* note 28, at 399.
270. THE RENEWABLES PORTFOLIO STANDARD: HOW IT WORKS AND WHY IT'S NEEDED, *supra* note 13.

for each excess ton of SO_2 produced.[271] It could also be based on the Environmental Protection Agency's National Ambient Air Quality Standards, which require twenty-two states and the District of Columbia to reduce NO_x emissions significantly by 2007.[272]

Texas provides one of the best examples of successfully setting high non-compliance penalties. In 1999, the Texas legislature required utilities to install 2,000 MW of new renewable capacity by 2009.[273] The standard was exceeded in 2001, with 915 MW of wind installed in that year alone.[274] What made the state RPS so successful? An in-state REC trading scheme was established to help track and account for renewable energy capacity and was coupled with strict enforcement penalties.[275] Utilities failing to meet the standard had to pay the lesser of five cents per kWh or 200% price of average REC prices for each missing kWh.[276] Because non-compliance penalties were set high above cost for installing new renewable energy technologies, "there is little incentive in Texas for developers to propose projects that do not have high probability of completion."[277]

Flexibility in compliance rules also helps reduce non-compliance.[278] In September 2006, for example, California accelerated its RPS from 20% by 2017 to 20% by 2010, effectively adopting the most ambitious RPS mandate in the nation.[279] However, to help regulated utilities meet such an aggressive RPS target, the legislature adopted rules giving any utility the option of deferring up to 25% of its compliance obligation in any single year for up to three years.[280] This rule effectively granted each regulated utility the ability to set its own compliance schedule

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271. *Id.*

272. Fredric Beck & Eric Martinot, *Renewable Energy Policies and Barriers*, *in* 5 ENCYCLOPEDIA OF ENERGY 365, 377 (2003).

273. *See* ENVTL. AND ENERGY STUDY INST., BIOENERGY: TECHNOLOGIES, FEDERAL AND STATE INCENTIVES 7 (2004), *available at* http://www.eesi.org/programs/agriculture/1.23.04%20bioenergy.pdf.

274. Ole Langniss & Ryan Wiser, *The Renewables Portfolio Standard in Texas: An Early Assessment*, 31 ELEC. J. 527, 529 (2002).

275. RYAN WISER & OLE LANGNISS, LAWRENCE BERKELEY NAT'L LAB., THE RENEWABLES PORTFOLIO STANDARD IN TEXAS: AN EARLY ASSESSMENT 14–15 (2003), *available at* http://eetd.lbl.gov/ea/ems/reports/49107.pdf.

276. *Id.* at 14.

277. *Id.* at 12.

278. *See, e.g.*, CAL. PUB. UTIL. COMM'N, RENEWABLE ENERGY CERTIFICATES AND THE CALI. RENEWABLES PORTFOLIO STANDARD PROGRAM 31 (2006), *available at* http://docs.cpuc.ca.gov/published/Report/55606.htm (follow "Word Document" hyperlink).

279. *See id* at 10.

280. *See id.* at 25.

without substantially altering the regulated RPS target

California's regulated utilities responded favorably to the change. Hal LaFlash, Director of Renewable Energy Policy and Planning for PG&E, recently told industry analysts that the increased flexibility recognized market realities and "will facilitate construction lead times and reduce boom-bust cycles."[281]

G. A National RPS Should Set Only a Floor, Allowing the States to Be More Aggressive

Setting a "floor" rather than a "ceiling" ensures that more aggressive state statutes are not precluded or restricted under a federal standard.[282] In essence, a national RPS would set a minimum that prohibits states—or in this case, utilities that operate within and between states—from deploying less renewable energy than a national standard, not more. The states should be free to exceed the federal standard as much as they wish. This type of compliance with state programs is often called "dual compliance" or "simultaneous compliance." The national standard would only guarantee the promotion of a minimum level of renewable energy deployment.

Such language should be clear and explicit in any national legislation, so as to provide the maximum amount of clarity and predictability to utilities and investors and to avoid leaving the question open to political attacks during Congressional deliberations. Congress did something similar with the Clean Air Act of 1965, which allowed California to establish vehicle air pollution emission standards.[283] "[A]ll other states are given the opportunity to adopt California's standards or to remain subject to the federal standards developed by the Environmental Protection Agency."[284] Such flexibility ensured that the states could continue to innovate while also mandating that all states moved forward in promoting cleaner air.

H. A National RPS Should Be Simple, and Set No Further

281. Hal LaFlash, Dir. of Renewable Energy Pol'y and Planning, Pac. Gas & Elec. Co., Presentation at the EUCI 3rd Annual Renewable Portfolio Standards Conference: Renewable Portfolio Standards & California Senate Bill 107, 11 (Apr. 23, 2007) (on file with author).

282. *See, e.g.*, Letter from John L. Geesman & Jackalyne Pfannenstiel, Cal. Energy Comm'n Renewables Comm., Responding to Questions of the Honorable John D. Dingell, Chairman, Comm. on Energy & Commerce 2 (June 18, 2007), *available at* http://www.energy.ca.gov/papers/2007-06-18_CONGRESSMAN_DINGELL_LETTER.PDF.

283. Kristen H. Engel, *Harnessing the Benefits of Dynamic Federalism in Environmental Law*, 56 EMORY L. J. 159, 162 (2006); 42 U.S.C. § 7543 (2000).

284. Engel, *supra* note 283, at 162; 42 U.S.C. § 7507 (2000).

Regulatory Interventions

Many advocates of both state and national RPS proposals have argued sometimes fiercely in favor of adding even more complexity into such statutes. Some advocates have argued for price ceilings on electricity rates to give utilities a possible safety valve. Other advocates have argued for mid-course reviews of RPS statutes to make sure that they are working. Still others have argued for credit multipliers—also called tiers or "carve outs"—for particular resources, such as solar energy; geographic restrictions; and limits on the capacity and size of eligible resources.

While some of these ideas have merit, the burden is on those in favor of further market interventions to justify them. Further regulations may unnecessarily complicate RPS statutes and inhibit the efficiency of a national RPS program. As researchers from the LBNL recently concluded: "[a] well-designed RPS should generally encourage competition among renewable developers and provide incentives to electricity suppliers to meet their renewable purchase obligations in a least-cost fashion."[285]

Two of the fundamental elements of a RPS—competition and least cost—are violated by creating carve outs; multipliers; geographic restrictions; or limits on capacity and size. In principle, competition and cost effectiveness is best served by letting the marketplace dictate when and where renewable technologies are deployed. In practice, such interventions have weakened the effectiveness of some state RPS proposals.

In Colorado, regulators unintentionally created a Catch-22 situation for renewable energy developers by inserting a "safety valve" into the state's RPS that limited electricity rates in the event that renewable energies end up costing more than expectations.[286] In designing the "safety valve," regulators pegged the rate cap to the avoided cost of natural gas generation by stipulating that:

> For each qualifying utility, the commission shall establish a maximum retail rate impact for this section of 1% of the total electric bill annually for each customer. The retail rate impact shall be determined net of new nonrenewable alternative sources of electricity supply reasonably available at the time of the determination.[287]

In other words, the regulations limited the difference in the

285. CHEN, WISE, & BOLINGER, *supra* note 81, at 1.
286. *See* COLO. REV. STAT. § 40-2-124(1)(g)(I) (2005).
287. *Id.*

cost of renewable electricity relative to the cost of the same amount of electricity if it had been generated using natural gas.[288] The problem is that, as earlier explained in Part II, the more renewable energy is deployed, the more it depresses the cost of natural gas. As renewable resources reach certain levels in the market, they offset natural gas consumption and decrease gas prices. By pegging the rate cap of renewable technologies to the cost of natural gas, it seems that Colorado's regulators have created a vicious cycle where renewable energy technologies can never reach sufficient levels: the more they effectively lower natural gas prices, the more they are penalized by the rate cap. In essence, Colorado regulators may have inadvertently undermined the state's RPS by intervening in the normal operation of the electricity supply market in order to "correct" a previous intervention.

As a second example, Arizona created a carve-out for solar PV technologies by mandating that at least 50% of the state's RPS be met by solar technologies.[289] To meet the non-solar part of the RPS, utilities bought approximately 10 MW of landfill gas and several additional MW of biomass energy.[290] However, utilities have been unable to fully comply with the solar mandate because of the sizeable financial commitment needed to purchase more expensive solar technology.[291]

Arizona has created even more incentives for the solar market by offering up to $4 per watt of utility-scale installed PVs.[292] However, utilities pass the higher cost of solar energy onto ratepayers. Tucson Electric Power is scheduled to complete a 64 MW thermal solar plant in Boulder City, Nevada, by the end of 2007, costing ratepayers an estimated $106 million,[293] even though solar PV is still by far the most expensive renewable

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288. Richard Mignogna, Presentation at the EUCI 3rd Annual Renewable Portfolio Standards Conference: Implementing Colorado's Renewable Portfolio Standard (Apr. 23, 2007).

289. GRACE, WISER & BOLINGER, *supra* note 245, at 14.

290. *Id.* at 2.

291. *Id.* at 2.

292. *See* Database of State Incentives for Renewables and Efficiency, Arizona Homeowner Incentives for Renewables and Efficiency, http://www.dsireusa.org/library/includes/maphomeowner.cfm?State=AZ&CurrentPageId=1&RE=1&EE=1 (last visited June 4, 2008); *see also* AM. SOLAR ELECTRIC, 2007 UTILITY INCENTIVES FOR ARIZONA UTILITY CONSUMERS 2 (2007).

293. *See Arizona Utility Coalitions Considers 250 MW Solar Power Plant*, ENVIRONMENTALLEADER.COM, Feb. 5, 2007, http://www.environmentalleader.com/2007/02/05/arizona-utility-coalition-considers-250-mw-solar-power-plant/.

energy technology in the state.[294]

Renewable Resource	Cost per Installed kW	Cost per Delivered kW
Solar	15 to 30 cents/kW	45 to 90 cents/kWh
Wind	4 to 5 cents/kW	16 to 20 cents/kWh
Biomass	6.5 to 10 cents/kW	6.5 to 10 cents/kWh
Geothermal	5 to 7 cents/kW	5 to 7 cents/kWh

Table 3: Delivered Average cost of Renewable Energy in Arizona (in 2004 dollars)

Allowing the market to dictate deployment does not mean utilities will refuse to invest in solar and other more expensive renewable energy technologies. It does, however, mean that utilities will not invest in them initially. Instead, power providers will maximize all of their least-cost options before moving to more expensive technologies. The Renewable Energy Policy Project explained:

> The RPS will tend to support those renewables that are cheapest at the margin. In California's case, wind power would likely benefit the most, with geothermal and biomass also benefiting as the size of the requirement increases. Distributed renewable generation technologies such as PV and small wind turbines are unlikely to benefit as much from the RPS in the near term, due to their higher cost and greater barriers to installation.[295]

The long term stability of a RPS ensures that investors and manufacturers will have time to develop more cost effective methods of utilizing renewable resources. In the long run, manufacturers may benefit from waiting until renewable energy technologies are ready for the market instead of forcing deployment of inferior technologies to meet unrealistic state targets.

294. *See* TSS CONSULTANTS, ARIZONA BIOMASS ENERGY OPPORTUNITIES 6 tbl. 1 (2004), *available at* http://www.cc.state.az.us/divisions/utilities/electric/EPS-TSSC.pdf.

295. RENEWABLE ENERGY POL'Y PROJECT, RENEWABLE ENERGY FOR CALIFORNIA 26 (2002), *available at* http://www.crest.org/repp_pubs/pdf/repp_calrenew_2002.pdf.

Lesson 1:	*Make the target aggressive but gradual*
Lesson 2:	*Instead of listing technologies, use a fuel-based definition of eligible resources*
Lesson 3:	*Apply the standard to electricity sales, not installed capacity*
Lesson 4:	*Require all retail providers to meet the standard (without exemption)*
Lesson 5:	*Establish uniform rules for trading RECs*
Lesson 6:	*Create flexible compliance rules with tough non-compliance penalties*
Lesson 7:	*Ensure that the national standard does not preempt more aggressive state action*
Lesson 8:	*Craft simple rules that do not require further regulatory intervention*

Table 4: The Eight Lessons of RPS Design

In the end, the point of a RPS is not to set restrictions on when and where renewables can be deployed. Like "natural selection," it is the market—not the regulators or politicians—that should decide which technologies investors should develop to meet a national RPS mandate.[296]

VI. CONCLUSIONS

Politicians and real estate moguls are fond of referring to things as "win-win" situations. The truth is that most important policy decisions involve winners *and* losers and benefits that accrue to one group often come at the expense of another. Every so often, constituencies align as if the stars and policymakers are faced with a true "win-win" situation. A properly designed national RPS is one of those rare choices. When compared to conflicting state-based RPS policies and their impact on energy markets and electricity pricing, a federal mandate could benefit ratepayers *and* regulated utilities in several unique ways that

296. *See* U.N. ENV'T PROGRAM, NATURAL SELECTION: EVOLVING CHOICES FOR RENEWABLE ENERGY TECHNOLOGY AND POLICY 24 (2000), *available at* http://www.unep.fr/energy/publications/ pdfs/naturalselection.pdf (noting that "energy markets will advance the goals of sustainable development when sound regulation is simple, efficient, and free from undue bureaucratic interference").

most policy advocates have not even considered.

For example, a national RPS would decrease consumer electricity prices by: (1) depressing the cost of fossil fuels used to generate electricity; (2) lowering the cost of natural gas used to heat and power homes; (3) minimizing the cost of transmission congestion; (4) protecting against rate hikes to recover infrastructure investments and stranded costs; and (5) preventing predatory trade-offs that require some ratepayers to subsidize others. Yet a national RPS would also achieve further objectives, such as: (1) decreasing regulatory compliance costs by reducing the need for costly litigation to clarify vague and competing state regulations; (2) lowering the administrative costs associated with inconsistent state standards; (3) making regulations more predictable to ease planning of resource investments; (4) creating economies of scale that decrease the cost of renewable energy technologies; (5) giving utilities greater flexibility in meeting RPS mandates by expanding the market of eligible renewable resources; (6) decreasing the cost of RECs by creating a uniform national market; and (7) encouraging the tracking of GHG emissions reductions before the implementation of a national carbon cap-and-trade program.

A national RPS would even benefit utility profits by: (1) maximizing the "hedge" benefits of renewable energy investments; (2) decreasing construction cost overruns and encouraging more modular generation; (3) displacing transportation costs associated with fossil fuel supply chains; (4) overcoming public opposition to new transmission infrastructure; (5) speeding cost recovery of transmission investments; (6) reducing the need for expensive reserve capacity; and (7) creating a level playing field that rewards strategic investment rather than location.

By producing thousands of new manufacturing, installation and maintenance companies, and by encouraging thousands of existing companies to expand into the burgeoning renewable technology manufacturing sector, a national RPS would help American companies by creating more new jobs for American workers in the same states that have lost the most manufacturing jobs. Furthermore, a national RPS would also produce other benefits, such as: (1) decreasing the number of sick days workers take because of illnesses related to power plant air pollution and accidents related to the mining, transportation and processing of fossil fuels and uranium; (2) increasing total consumer income by up to $8.2 billion by 2020; and (3) enhancing U.S. Gross Domestic Product ("GDP") by up to $10.2 billion by 2020.

Finally, as if the aforementioned benefits were not enough, a national RPS would provide secondary environmental and social benefits in the following ways: (1) conserving substantial amounts of water in drought-prone areas; (2) decreasing the number of premature deaths and illnesses related to power plant air pollution and transportation and storage accidents; (3) offsetting millions of tons of GHGs that contribute to global warming; and (4) reducing the amount of America's wilderness that is consumed to generate electricity using fossil fuels and nuclear power.

Given such obvious and overwhelming advantages, it is hard to believe that many utilities and policymakers diligently oppose a federal RPS mandate, repeating myths that have long since been debunked. Largely, the remaining objections to federal intervention constitute a diminishing series of canards that mischaracterize a national RPS policy as an unnecessary federal intervention in a relatively free market. A majority of states are well on their way to imposing their own clunky, overlapping, inconsistent, competing, and sometimes irrational mess of mandates.

In contrast to the national distribution of fossil fuels, all states possess renewable resources that they can affordably develop. However, under the current system of state mandates, some RPS states are "losers" by subsidizing the cheap, polluting electricity in non-RPS states. Other RPS states are victims of inconsistencies from state mandates that produce perverse predatory trade-offs and require them to export their cheap in-state renewable electricity to other states in exchange for more expensive electricity or renewable energy credits. A national mandate would level the playing field by creating consistent, uniform rules and by allowing utilities to purchase RECs or develop renewable resources anywhere they are cost competitive.

Experience from existing state RPS programs proves that mandates with broad eligibility actually have led to the development of many different renewable resources. Utilities have already demonstrated that they can meet state RPS requirements by deploying a diverse portfolio of renewable resources that best match their service areas.

By expanding—geographically and monetarily—the market for renewable resources, a national RPS is likely to diversify the deployment of renewable energy technologies even further. In Nevada, geothermal energy may be cheaper to develop than wind. In the Pacific Northwest, incremental hydropower may be cheaper than solar power. In the Southeast, biomass may be the most affordable. A national RPS mandate with a fuel-based definition of eligible renewable resources ensures that free market principles—rather than regulatory set-asides or political patronage—determine which technologies will be most cost competitive in certain areas of the country. An added bonus is that a uniform national RPS decreases compliance costs for regulated utilities, because a technology-neutral mandate allows utilities to meet RPS obligations using the technology that is most cost competitive for the fuels available.

It is time that federal policymakers engage in an informed, comprehensive and rational debate about the few remaining objections to a federal RPS mandate. America faces serious and mounting energy problems, including: (1) continued dependence on dwindling foreign sources of fossil fuels and uranium; (2) an undiversified electricity fuel mixture that leaves the nation vulnerable to serious national security threats; (3) reliance on an ancient and overwhelmed transmission grid that risks more common, pronounced, and expensive catastrophic system failures; (4) an impending climate crisis that will require massive and expensive emissions controls costing billions of dollars and substantially reducing U.S. GDP; and (5) loss of American economic competitiveness as Europe and Japan become the major manufacturing center for new renewable energy technologies

By establishing a consistent, national mandate and uniform trading rules, a national RPS can create a more just and predictable regulatory environment for utilities while jump-starting a robust national renewable energy technology sector. Through offsetting electricity that utilities would otherwise generate with conventional and nuclear power, a national RPS would decrease electricity prices for American consumers while protecting human health and the environment.

There is a time for accepting the quirks and foibles of state experimentation in national energy policy, and there is a time to look to the states as laboratories for policy innovation. Now is the time to model the best state RPS policies and craft a coherent national policy that protects the interests of regulated utilities *and* American consumers.